California Trauma System 2019:

From The State Perspective

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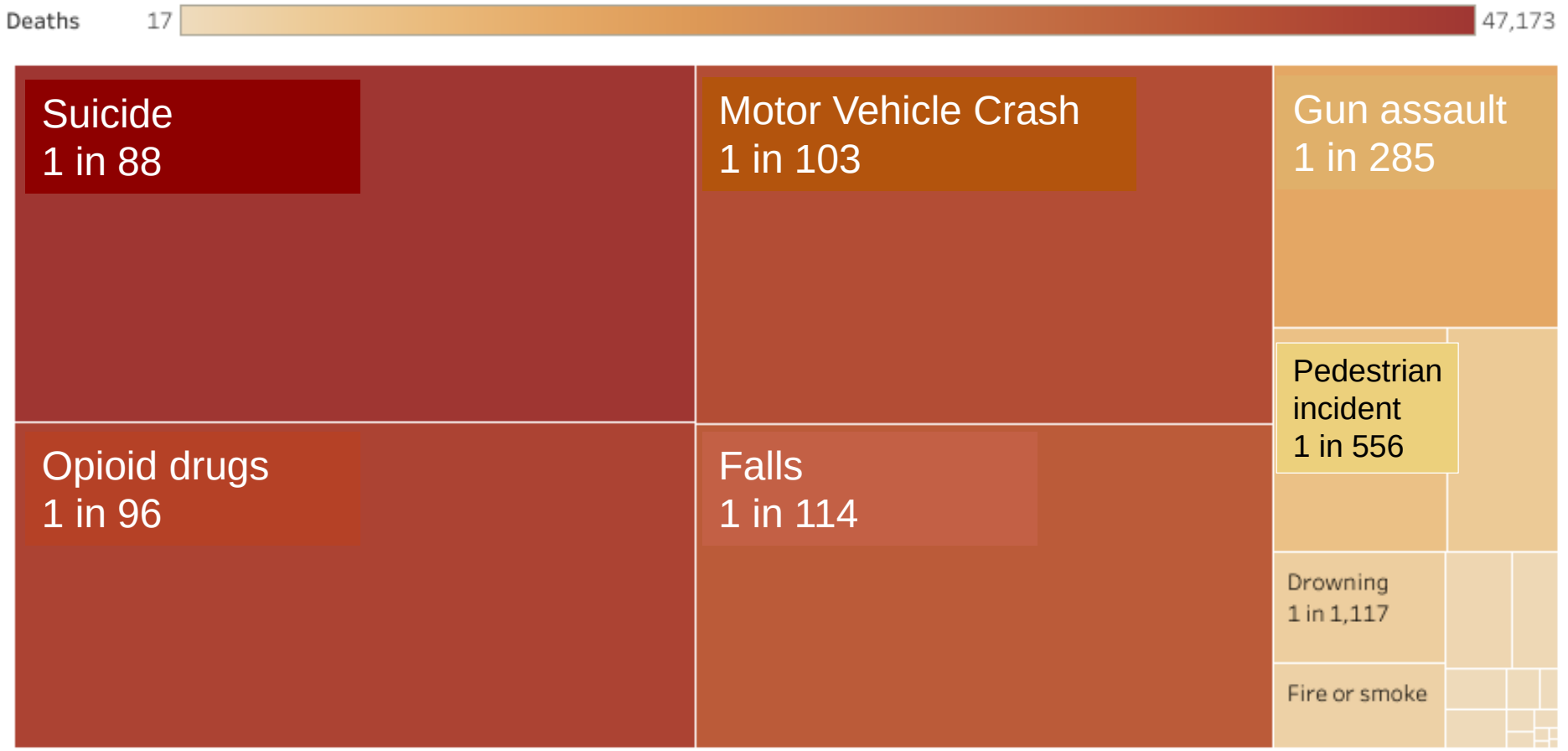
Objectives

- Describe the structure of the California Trauma System
- Discuss State policies and initiatives
- Explore the significance of pertinent new research on EMS--trauma

10 Leading Causes of Death by Age Group, United States – 2017

	Age Groups									
Rank	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+
1	Congenital Anomalies 4,580	Unintentional Injury 1,267	Unintentional Injury 718	Unintentional Injury 860	Unintentional Injury 13,441	Unintentional Injury 25,669	Unintentional Injury 22,828	Malignant Neoplasms 39,266	Malignant Neoplasms 114,810	Heart Disease 519,052
2	Short Gestation 3,749	Congenital Anomalies 424	Malignant Neoplasms 418	Suicide 517	Suicide 6,252	Suicide 7,948	Malignant Neoplasms 10,900	Heart Disease 32,658	Heart Disease 80,102	Malignant Neoplasms 427,896
3	Maternal Pregnancy Comp. 1,432	Malignant Neoplasms 325	Congenital Anomalies 188	Malignant Neoplasms 437	Homicide 4,905	Homicide 5,488	Heart Disease 10,401	Unintentional Injury 24,461	Unintentional Injury 23,408	Chronic Low. Respiratory Disease 136,139
4	SIDS 1,363	Homicide 303	Homicide 154	Congenital Anomalies 191	Malignant Neoplasms 1,374	Heart Disease 3,681	Suicide 7,335	Suicide 8,561	Chronic Low. Respiratory Disease 18,667	Cerebro-vascular 125,653
5	Unintentional Injury 1,317	Heart Disease 127	Heart Disease 75	Homicide 178	Heart Disease 913	Malignant Neoplasms 3,616	Homicide 3,351	Liver Disease 8,312	Diabetes Mellitus 14,904	Alzheimer's Disease 120,107
6	Placenta Cord. Membranes 843	Influenza & Pneumonia 104	Influenza & Pneumonia 62	Heart Disease 104	Congenital Anomalies 355	Liver Disease 918	Liver Disease 3,000	Diabetes Mellitus 6,409	Liver Disease 13,737	Diabetes Mellitus 59,020
7	Bacterial Sepsis 592	Cerebro-vascular 66	Chronic Low. Respiratory Disease 59	Chronic Low Respiratory Disease 75	Diabetes Mellitus 248	Diabetes Mellitus 823	Diabetes Mellitus 2,118	Cerebro-vascular 5,198	Cerebro-vascular 12,708	Unintentional Injury 55,951
8	Circulatory System Disease 449	Septicemia 48	Cerebro-vascular 41	Cerebro-vascular 56	Influenza & Pneumonia 190	Cerebro-vascular 593	Cerebro-vascular 1,811	Chronic Low. Respiratory Disease 3,975	Suicide 7,982	Influenza & Pneumonia 46,862
9	Respiratory Distress 440	Benign Neoplasms 44	Septicemia 33	Influenza & Pneumonia 51	Chronic Low. Respiratory Disease 188	HIV 513	Septicemia 854	Septicemia 2,441	Septicemia 5,838	Nephritis 41,670
10	Neonatal Hemorrhage 379	Perinatal Period 42	Benign Neoplasms 31	Benign Neoplasms 31	Complicated Pregnancy 168	Complicated Pregnancy 512	HIV 831	Homicide 2,275	Nephritis 5,671	Parkinson's Disease 31,177

Lifetime Odds of Dying for Selected Causes, United States, 2017



Source: National Center for Health Statistics.--Mortality Data for 2017 as compiled from data provided by the 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program. Deaths are classified on the basis of the Tenth Revision of "The International Classification of Diseases" (ICD-10), which became effective in 1999.

Why and How Trauma Patients Die

Callcut R, et al. J Trauma Acute Care Surg. 2019 Jan 10

- 18 trauma centers prospectively enrolled
  - 1563 adult trauma pts (74.5% male)
- Mechanism: falls most common (26.6%),
  - GSW second (24.3%)
- Cause of death
  - TBI 45% (non-survivable 82.2%)
  - Exsanguination 23%
  - Exsanguination predominant early and TBI later

California Trauma System

Trauma Centers

Patient Care, Quality

Trauma Director, Coordinator, Medical Staff

Local EMS Agencies

Medical Direction, Procedures, Plan, Designation, Policies, Implement / Evaluate

EMS Administrator, Medical Director

RTCCs

Regional Collaboration/ coordination, QA/PI

(note: no authority over LEMSA)

Chair, Trauma Coordinator & LEMSA Staff

EMS Authority

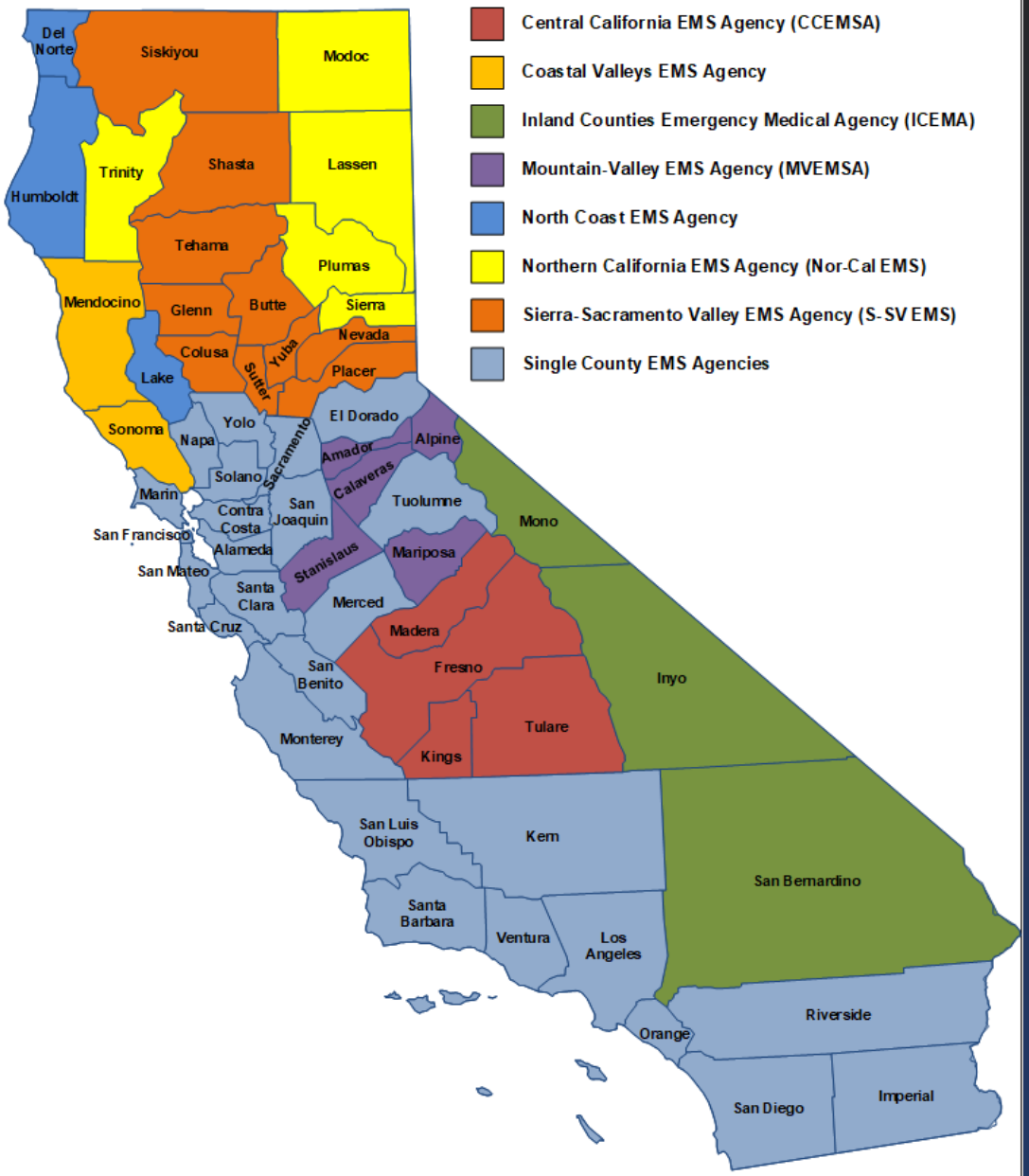
Regulation, Data, Quality, Oversight

Trauma Coordinator, EMSA staff

TRAUMA CENTERS BY DESIGNATION

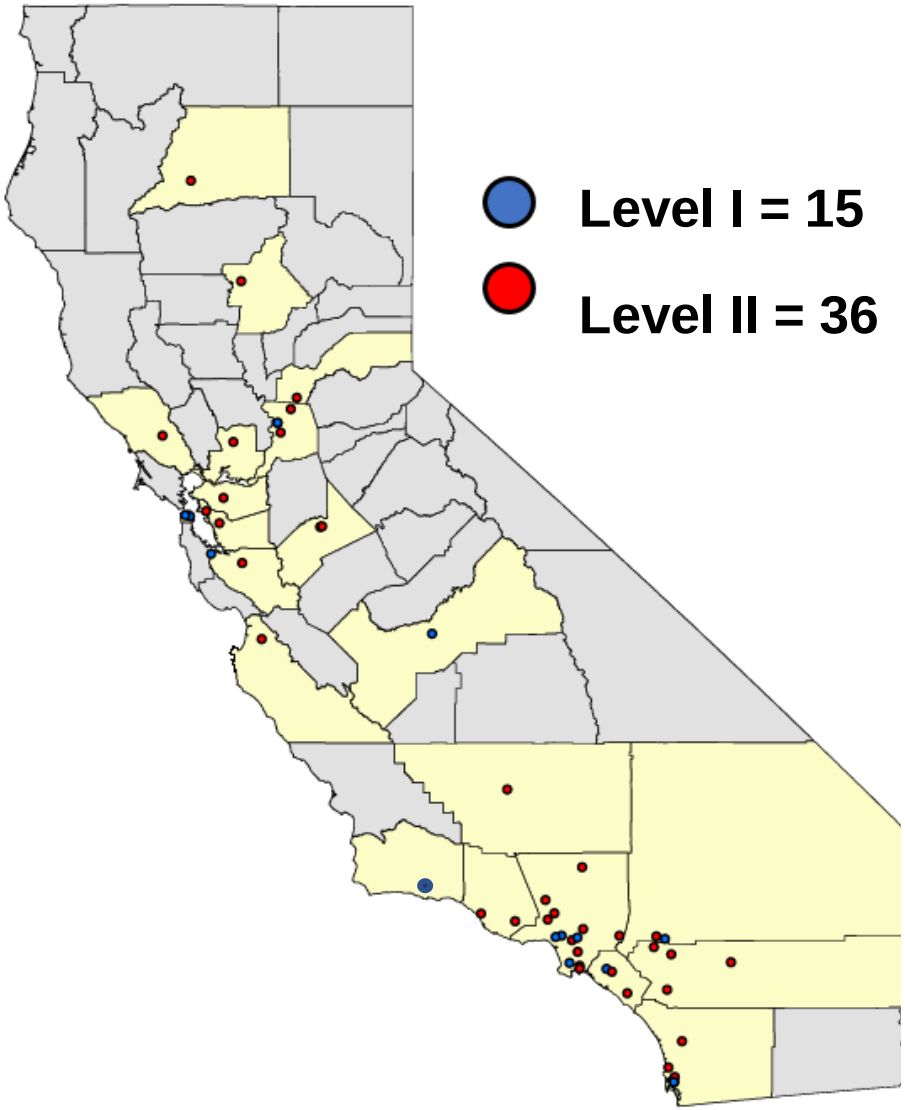
Level I Pediatric Trauma Center Only	3
Level II Pediatric Trauma Center Only	2
Level I Trauma Center & Level I Pediatric Trauma Center	4
Level I Trauma Center & Level II Pediatric Trauma Center	6
Level II Trauma Center & Level II Pediatric Trauma Center	4
Level I Trauma Center	5
Level II Trauma Center	32
Level III Trauma Center	13
Level IV Trauma Center	11
TOTAL:	**80**

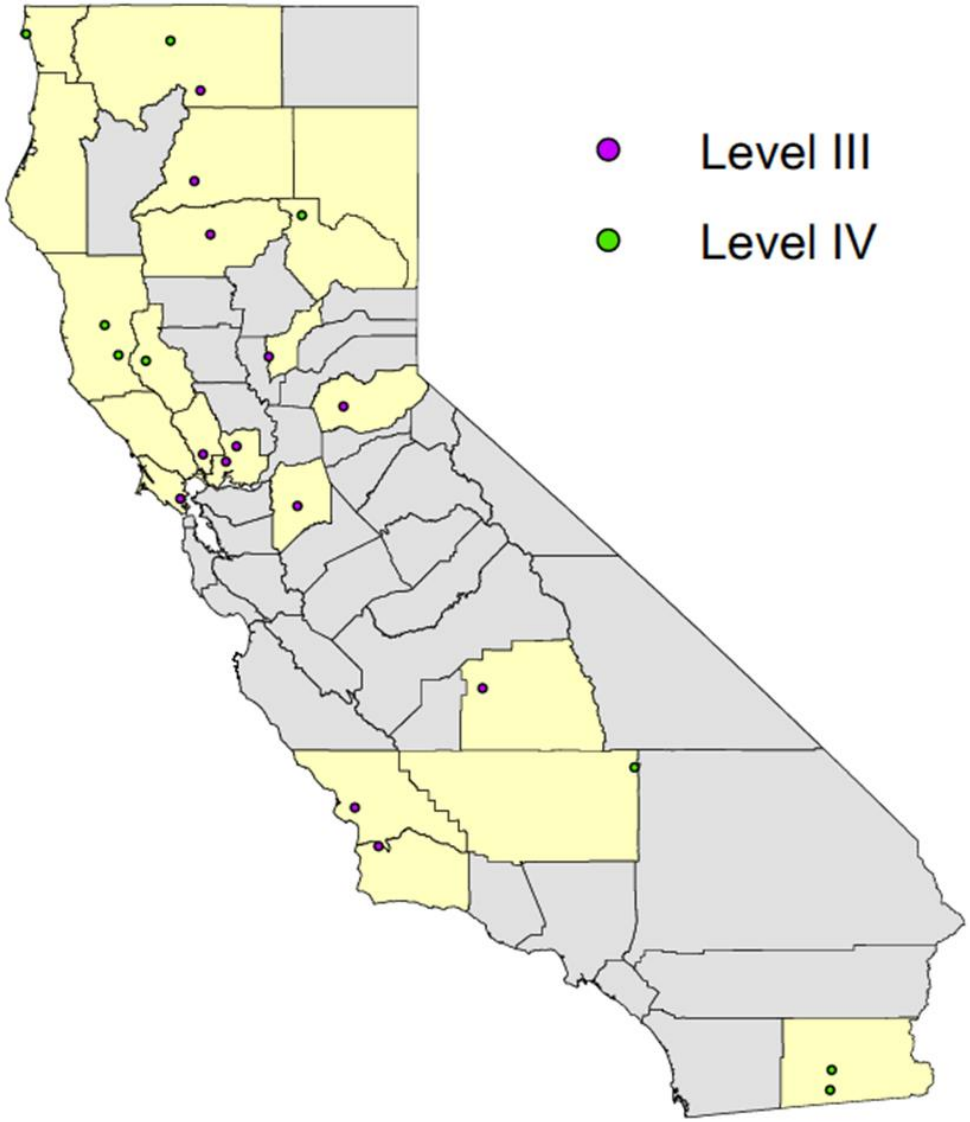
California Local EMS Agencies (LEMSAs)



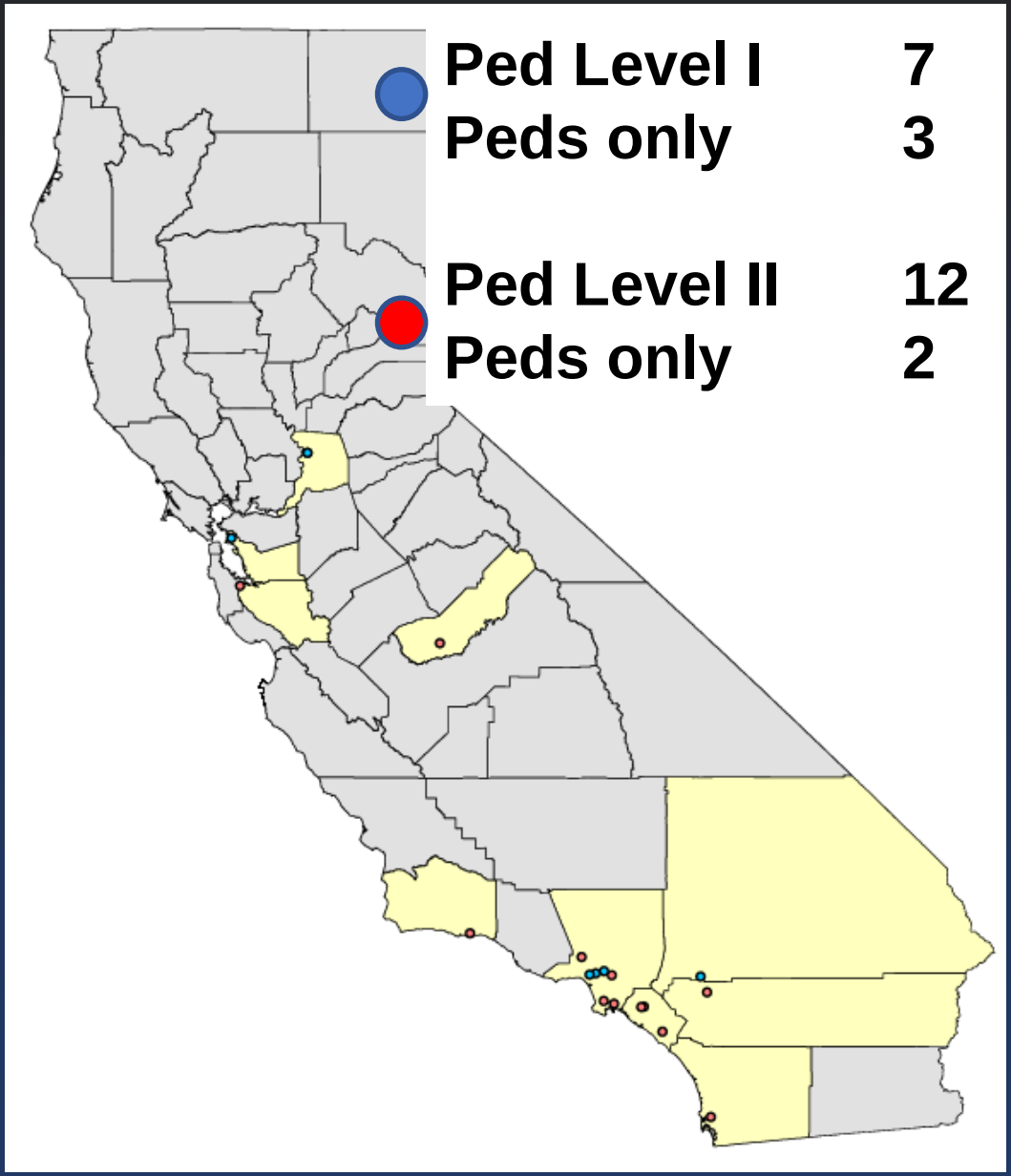
Regional Trauma Coordinating Committees

Adult Trauma Centers

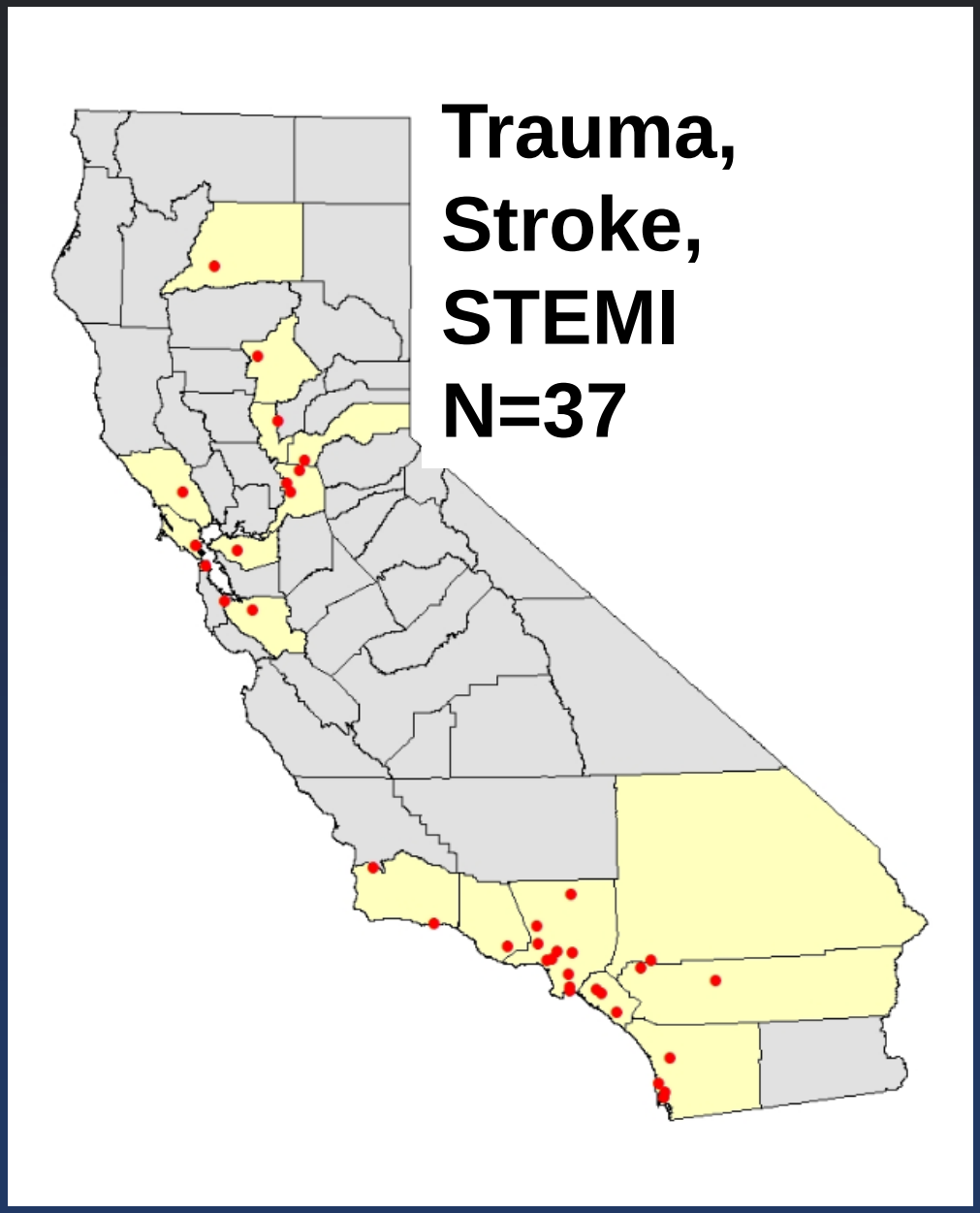




Pediatric Trauma Centers



Triple Designated Centers



Stroke, STEMI, EMSC Regulations

- Stroke and STEMI approved by the Office of Administrative Law last week!
- EMSC pending at OAL

Trauma Regulations Revision

- Appoint work group of technical experts
- Delineate new policy concepts and significant changes prior to drafting

Policy issue: Verification vs Designation

Level I Adult Trauma Centers ACS Verified	15
Level I Adult Trauma Centers LEMSA Designated	14
Level II Adult Trauma Centers ACS Verified	34
Level II Adult Trauma Centers LEMSA Designated	36
Level III AdultTrauma Centers ACS Verified	11
Level III Adult Trauma Centers LEMSA Designated	13
Level IV Adult Trauma Centers LEMSA Designated (No ACS)	11
Total Adult Trauma Centers ACS Verified (LI-III)	**60**
Total Adult Trauma Centers LEMSA Designated (LI-IV)	**74**
Total Combined Adult Trauma Centers (ACS & LEMSA)	**74**

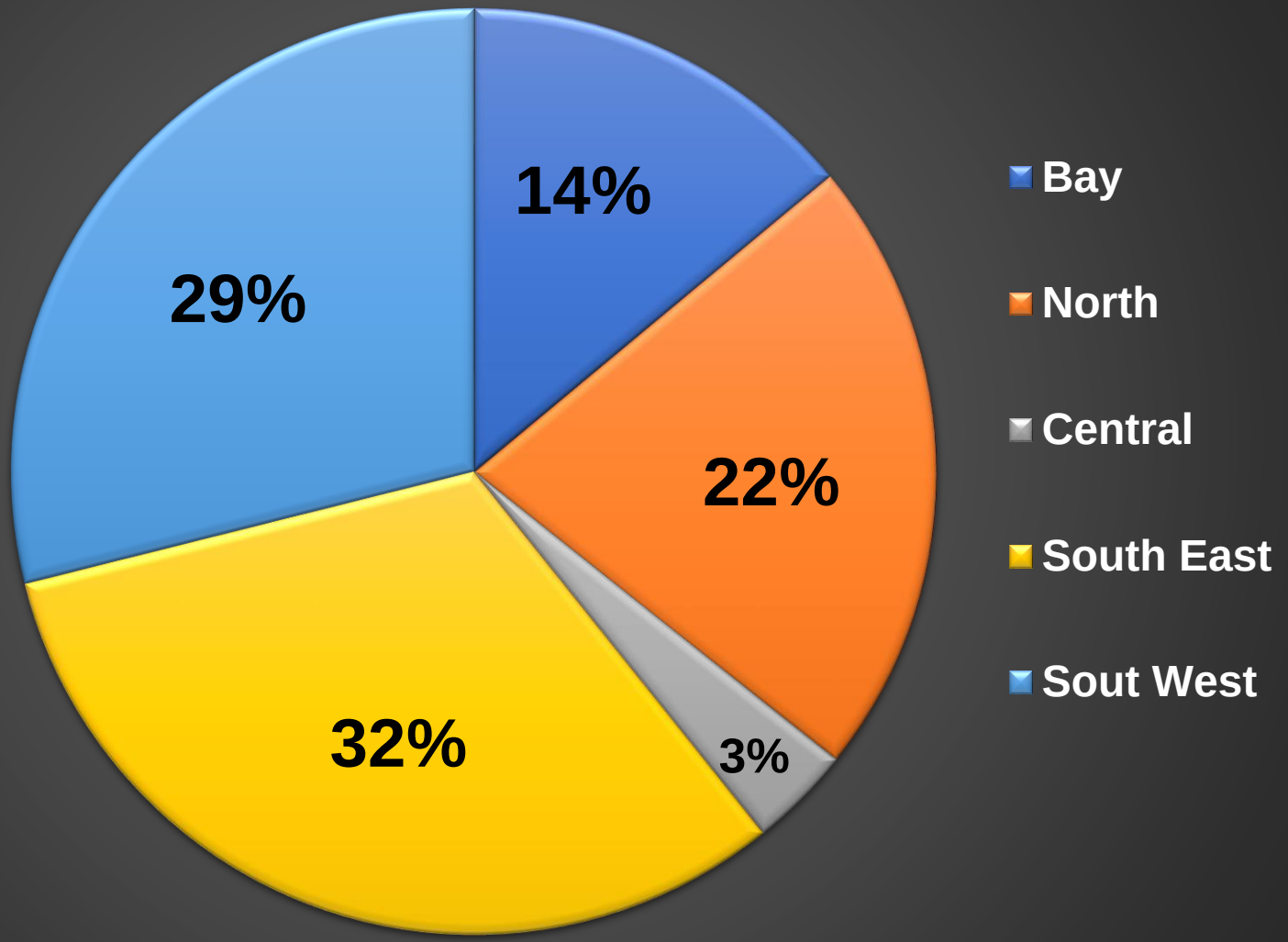
Pediatric Trauma Centers

Level I Pediatric Trauma Centers ACS Verified	6
Level I Pediatric Trauma Centers LEMSA Designated	8
Level II Pediatric Trauma Centers ACS Verified	10
Level II Pediatric Trauma Centers LEMSA Designated	9
Total Pediatric Trauma Centers ACS	**17**
Total Pediatric Trauma Centers LEMSA Designated	**17**

CEMSIS and Trauma Data

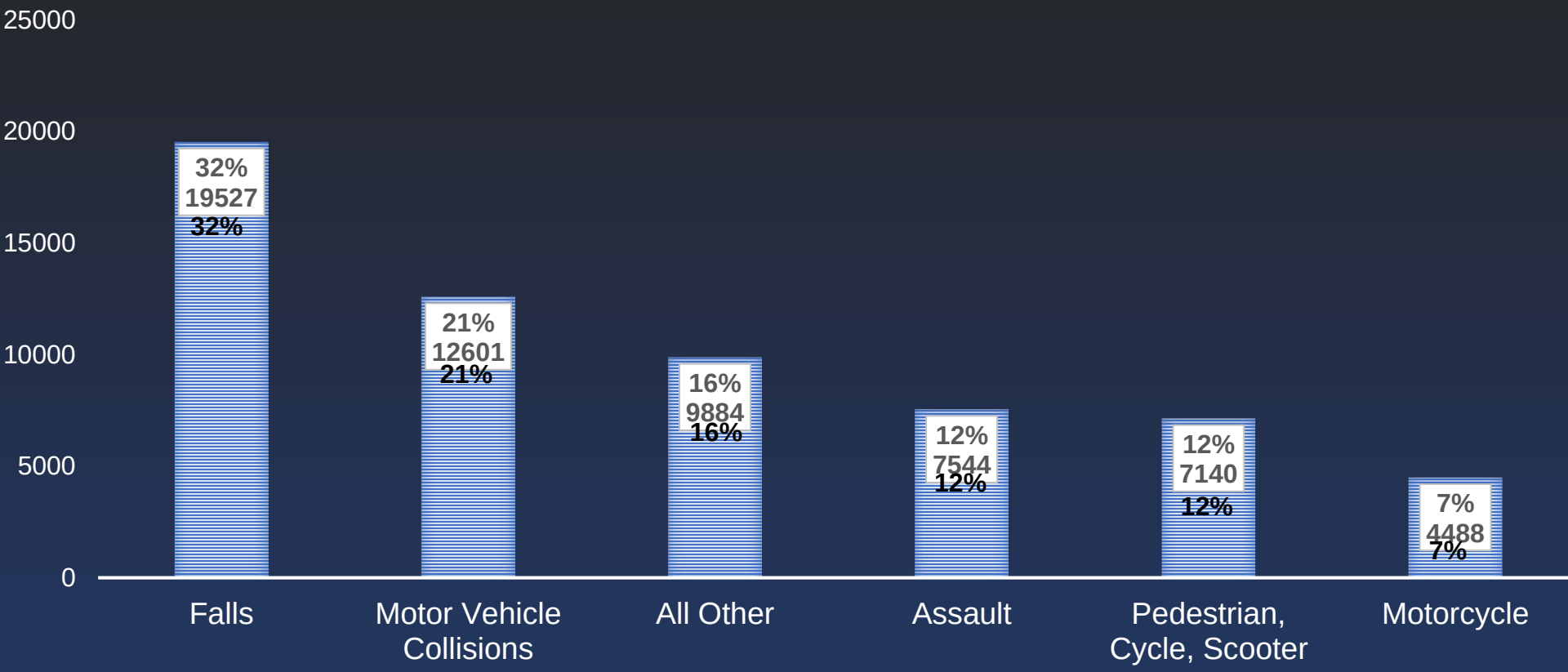
- 31/33 LEMSA reporting some or all
  - > 60% provider agencies reporting
  - 3.9 million records for 2018
- Trauma
  - 78/80 centers reporting data

2017 Trauma Incidents By RTCC
N= 89,198



Source: 2017 CEMSIS-Trauma Data

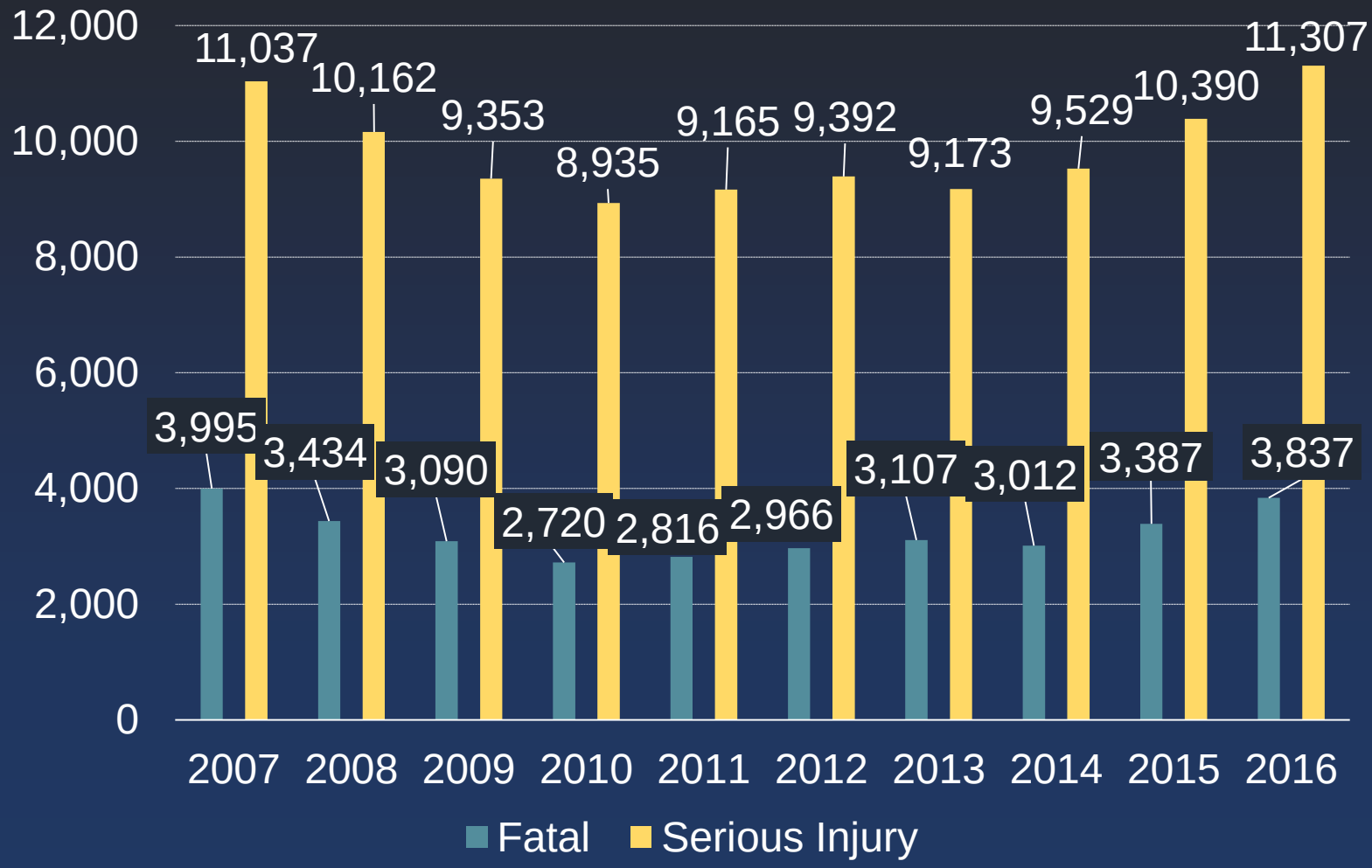
2017 TRAUMA INCIDENTS (N = 61,184)



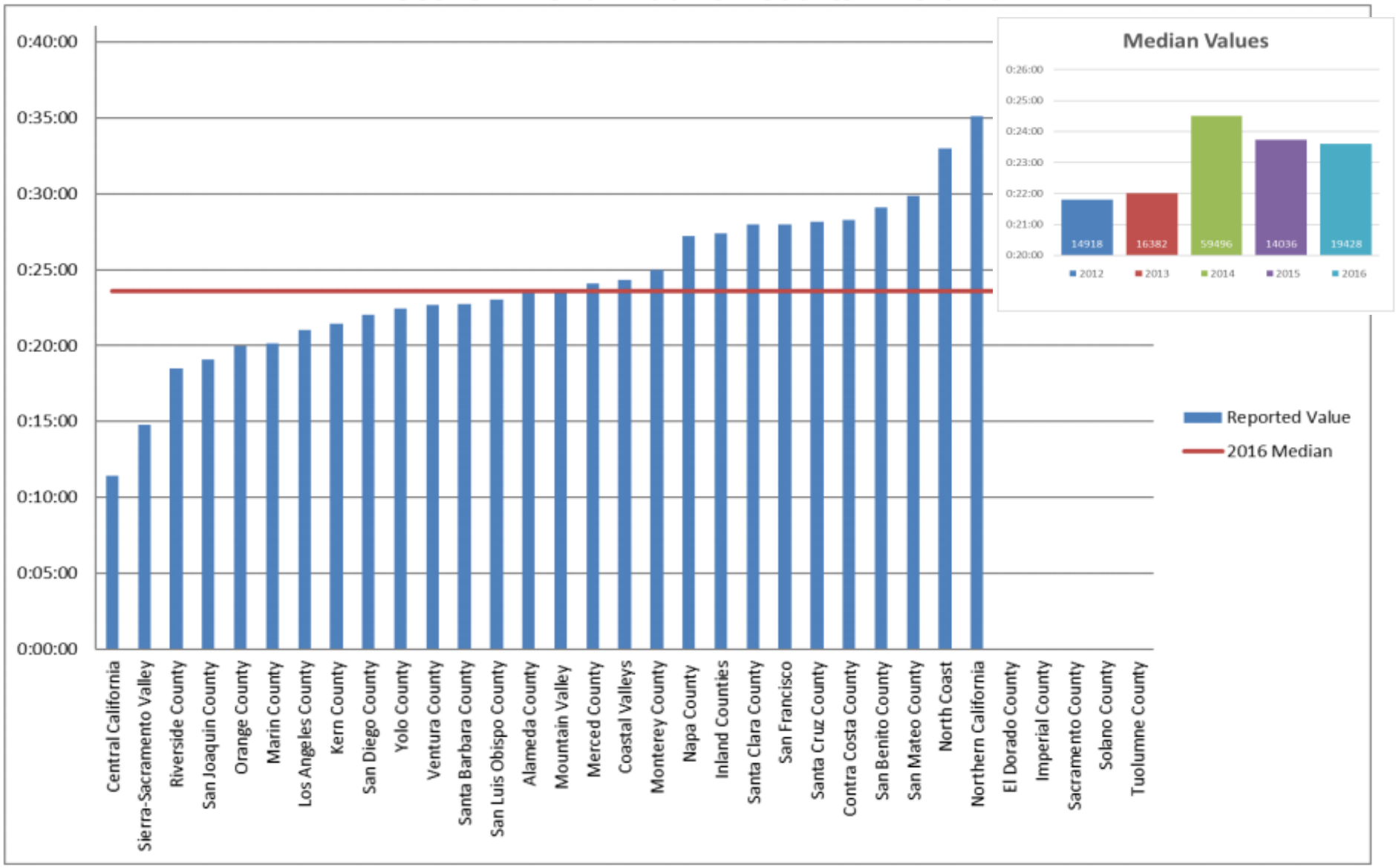
Trauma Incident Type and Percent of Total Incidents

*Source: EMS Authority, CEMSIS-Trauma, April 5, 2019

Traffic Collision Fatalities and Serious Injuries California 2007-2016



TRA-1: Scene Time for Trauma Patients – Part 1 of 2



Prehospital scene time and interventions on mortality outcomes

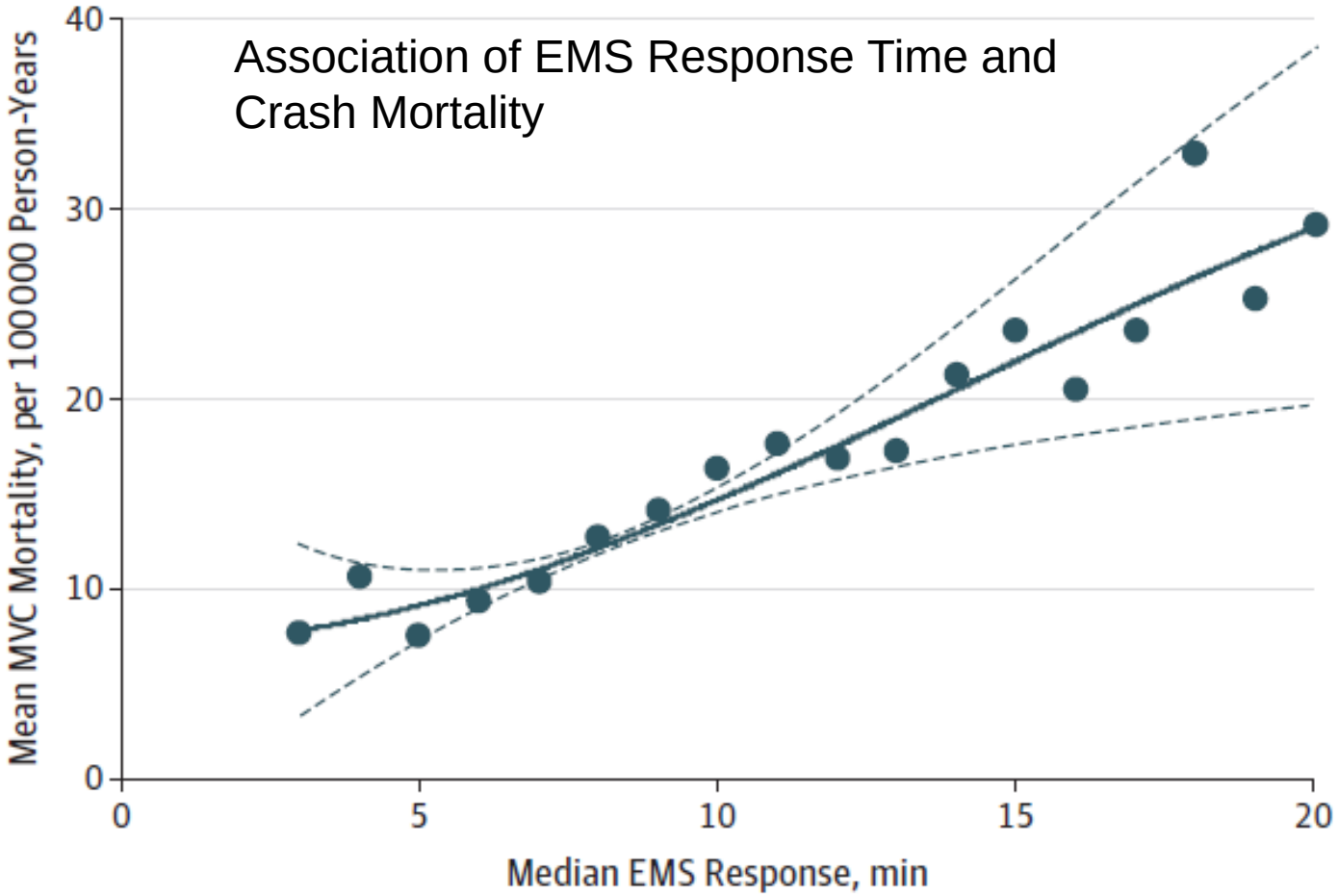
Ruelas OS, et al. PEC 2018:22

- Retrospective NEMSIS 2014 data
  - 2,018,141 cases included: 96.1% blunt, 3.9% penetrating; total severe=227,032
- Scene times
  - Blunt: 18.1 ± 36.5; penetrating 16.0 ± 45.3 min
- Procedures: blunt died in the ED=6.5 ± 4.3, admitted= 3.1 ± 2.3; penetrating 5.7 ± 3.4; 2.6 ± 2.0
- Penetrating trauma significantly higher prehospital and ED mortality
- Increased scene time and # procedures associated with higher mortality

Association of EMS Response Time and Crash Mortality (2013-2015)

- Population study using NEMSIS and NHTSA data
- 2,214,480 ambulance responses in 2268 counties
- Median county response time 9 minutes (7-11)
- Higher MVC mortality ≥12 min vs < 7 minutes (mortality ratio 1.46; 95% CI, 1.32-1.61)
  - Held across urban and rural
- Efforts to address regional disparities in MVC mortality should evaluate EMS response times as a potential contributor

James P. Byrne, et al. JAMA Surg. Published online February 6, 2019.

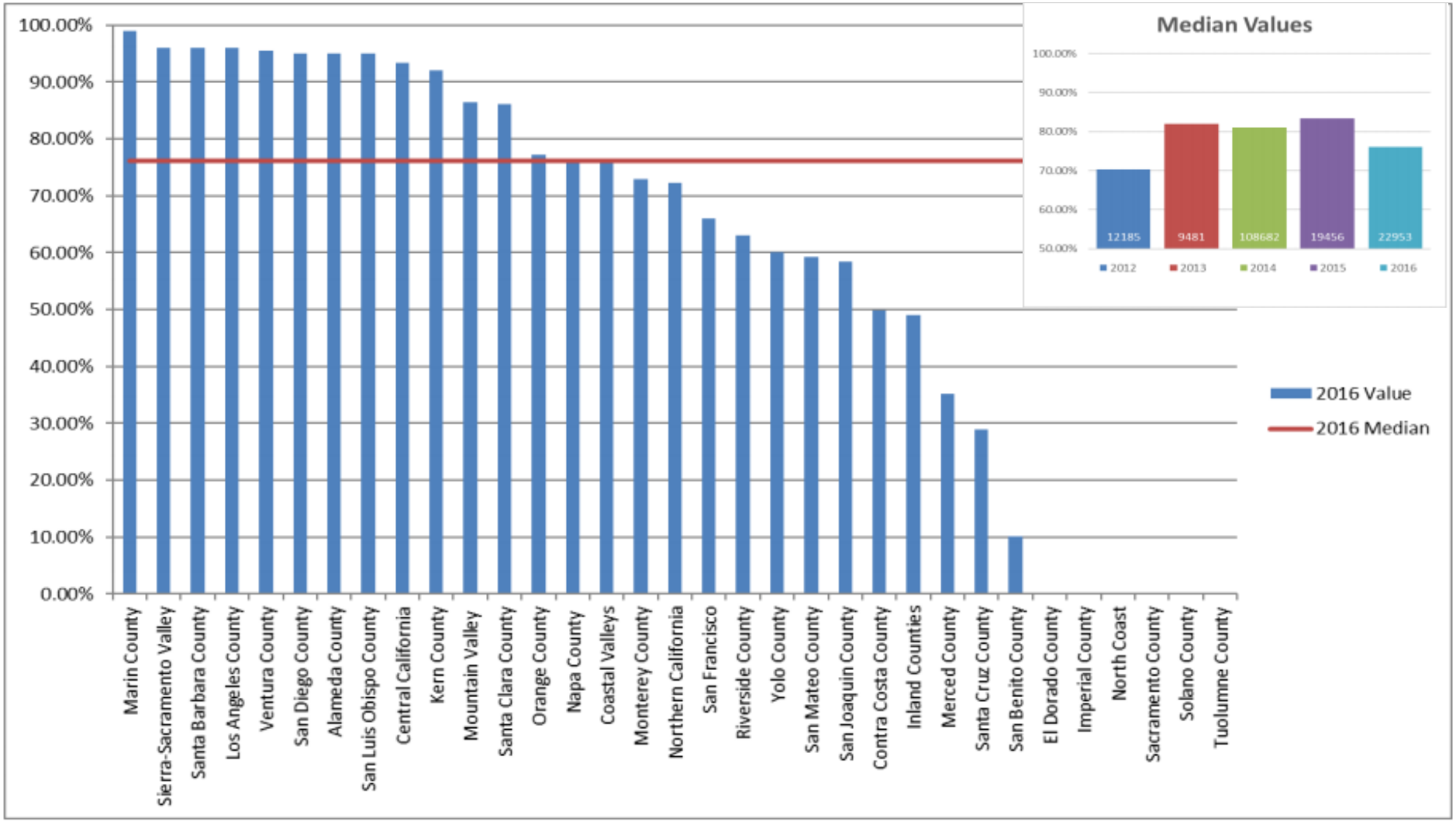


Counties with level I or II trauma centers had crash mortality rates 35% lower than those with no nearby trauma center.

State laws allowing higher speed limits were associated with greater mortality.

James P. Byrne, et al. JAMA Surg. Published online February 6, 2019.

TRA-2: Direct Transport to Designated Trauma Center for Trauma Patients Meeting Criteria – Part 1 of 2



Statewide Trauma System Retriage and Transfer Resource Guide 2019

- Re-triage is the urgent/emergent transport of a critically injured patient from a non-trauma facility ED or lower level Trauma Center to the appropriate level for definitive care.
- Toolkit to assist local EMS agencies develop transfer and triage policies and procedures
- Public comment Jan 4-Feb 17
- Present to EMS Commission, June 2019

Health Information Exchange matching grant from CMS

- Grant to link EMS and hospitals
- Better deterministic patient matching for information exchange
- ALERT phase delivers better digital information to the ED
  - —Advance notification allows trauma team activation
- RECONCILE: PHI from hospital for QI
  - Match ePCR 1° impression to hospital ICD10
  - Admission, Discharge, and Transfer outcome
- DHCS has additional grant for hospitals

Unified Paramedic Scope of Practice (Local Optional SOP)

1. Pediatric intubation
2. RSI (rapid sequence induction) medication administration including: sedatives, paralytics, analgesics, and induction agents
3. Supraglottic airways
4. Video laryngoscopy (indirect laryngoscopy)
5. I/O (intraosseous access) for both adult and pediatrics
6. Ventilator initiation, maintenance and management

TXA prehospital
Local Optional Scope Approved

- Alameda
- Riverside
- San Luis Obispo
- Santa Barbara
- Ventura
- Yolo
- Inland Counties
- Sierra-Sac Valley
- Sacramento
- Merced
- NorCal
- Napa
- Coastal Valley

Prehospital TXA: Indications

Hypovolemic shock secondary to trauma in patients who meet ALL of the following:

- < 3 hours post injury
- Systolic BP < 90 mmHg, observed or reported
- > 14 years old or if ≤ 14 years old, weighing > 45 kg (100 lbs)
- Includes multisystem trauma patients with associated spinal or head injury.

Injuries from Standing Electric Scooters

- Scooter injuries presenting to either of 2 EDs affiliated with the University of California, Los Angeles (UCLA)
- 249 patients
  - 58% male; mean age 33.7
  - 8.4% pedestrians hit by scooter or tripped over scooter
  - 4.4% wore helmet (only 12% of records documented helmet)

Tarak K. *JAMA Network Open.* 2019;Jan 25, 2(1)

Injuries from Standing Electric Scooters

Injury characteristics[d]			
Any fracture	71 (31.1)	8 (38.1)	79 (31.7)
Upper extremity			
Distal	30 (13.2)	1 (4.8)	31 (12.5)
Proximal	15 (6.6)	2 (9.5)	17 (6.8)
Lower extremity			
Distal	9 (4.0)	2 (9.5)	11 (4.4)
Proximal	3 (1.3)	0	3 (1.2)
Facial	12 (5.3)	2 (9.5)	14 (5.6)
Vertebral column	2 (0.9)	0	2 (0.8)
Thoracic	3 (1.3)	1 (4.8)	4 (1.6)
Head injury	92 (40.4)	8 (38.0)	100 (40.2)
Minor head injury[e]	87 (38.2)	8 (38.0)	95 (38.2)
Intracranial hemorrhage	5 (2.2)	0	5 (2.0)
Contusions, sprains, and lacerations with no fracture or head injury	63 (27.5)	6 (28.6)	69 (27.7)
Dislocations			
Major[f]	9 (3.9)	0	9 (3.6)
Minor[g]	2 (0.9)	0	2 (0.8)
Procedural sedation for fracture reduction or joint dislocation	8 (3.5)	0	8 (3.2)
Lacerations	65 (28.5)	6 (28.6)	71 (28.1)
Major intra-abdominal or intrathoracic injuries[h]	3 (1.3)	0	3 (1.2)

13 patients were admitted to floor or observation, 2 patients to ICU (one traumatic subarachnoid hemorrhage, the other a subdural hematoma)

AB 1708 (Rodriquez) Public Trauma Kits

- Specified buildings must have trauma PAK
  - 2 tourniquets
  - 2 pressure dressings
  - 4 chest seals
  - Other approved materials
  - Instructional documents
- Liability protection

Equipping Public Spaces to Facilitate Rapid Point-of-Injury Hemorrhage Control After Mass Casualty

Mass Casualty Type	Mean Total Victims Killed or Injured	Mean Killed (%)	Median Total Victims Killed or Injured
Shooting	5–11	1–6 (21–51)	4–6
Intentional vehicle attack	51	8 (16)	13
Stabbing	< 2	< 2 (< 10)	< 2
Blasts	5–34	1–10 (20–30)	. . .[a]

[a]Cannot determine from data used.

Data for all mass casualty attacks noted in reports and databases
Unable to say what percent could be saved by bleeding control.

Planners at public venues should consider equipping their sites with supplies to treat a minimum of 20 bleeding victims during a mass casualty attack.

Goolsby et al. Am J Public Health. 2019;109:236–241

Failure Rate of Prehospital Needle Decompression (ND)

Lesperance RN, et al. Am Surg 2018

- 335 patients had prehospital ND 2nd ICS
  - CT scans to evaluate catheter placement and chest wall thickness
- 39% and 76% of attempts at ND failed to reach the pleural space (2 different techniques of evaluation)
- at least 39% of patients did not have a tension pneumothorax
- Injured side of chest significantly thicker than normal side

State Trauma System Leaders

Elizabeth Winward, MA
State Trauma Coordinator

LEMSA Administrators
LEMSA Medical Directors

Robert Mackersie, MD, FACS Chair, State Trauma Advisory Committee

Trauma Managers Advisory Committee

Regional Trauma Coordinating Committee Chairs

Region 1 North — Frank Kennedy MD, FACS

Region 2 Bay — Adella Garland, MD, FACS; Chris Newton, MD, FACS, FAAP

Region 3 Central — Jim Davis, MD, FACS

Region 4 East — Jeff Upperman, MD, FACS, FAAP

Region 5 West — John Steele, MD, FACS

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

Centers for Medicare and Medicaid Services

Emergency Medical Treatment and Labor Act Basics

2019 State of California Trauma Summit

April 23, 2019

Objectives

- The Emergency Medical Treatment and Labor Act (EMTALA):
  - What and why?
  - Where has it been?
  - Where is it going?
- Innovation Opportunities
- Quick review of the basics
- Case Scenarios and Knowledge Checks
- Q and A

Disclaimers

- This presentation assumes basic knowledge of EMTALA

- I do not have all the answers …

Brief History of EMTALA

- What and why was EMTALA enacted?
  - Signed into law in 1986 as an anti-dumping measure to protect individuals in need of emergency medical treatment including women in labor
    - Required of all Medicare participating hospitals with EDs and those without EDs but with specialized services
    - Regardless of ability to pay or type of insurance

Brief History of EMTALA (Cont'd)

- Basic premise of law remains unchanged
- EMTALA violations may result in:
  - From CMS : enforcement and potential termination from Medicare
  - From Office of Inspector General (OIG): civil monetary penalties

EMTALA Today and Going Forward

- Current Trends
  - **Important** protection for patients
  - Longstanding policy but non-compliance persists, as noted in both CMS and OIG enforcement actions
  - Not uncommon to receive requests to modify EMTALA from:
    - Industry
    - Government representatives
    - Other Federal and State agencies

Innovation Opportunities

- Center for Medicare and Medicaid Innovation's (Innovation Center) **Emergency Triage, Treat, and Transport (ET3) Model**
  - Voluntary, five-year payment model
  - Start date is January 2020
  - Focused on emergency response through the 911 system
  - Key participants will be the Medicare-enrolled ambulance service suppliers and hospital-owned ambulance providers
  - For more information: Please visit https://innovation.cms.gov/initiatives/et3/

EMTALA Basic Requirements

- Medical screening examination
- Further examination and stabilizing treatment for an emergency medical condition
- On-call coverage
- Transfer/discharge of patients
- Acceptance of patients with un-stabilized emergency conditions requiring a higher level of care
- No delay of required services, including transfers, for insurance or payment reasons

When does EMTALA begin?

- Four Paths to EMTALA —
  - Individual presents to "dedicated emergency department" (ED/OB) seeking/in need of examination or treatment for a **medical** condition
  - Individual presents elsewhere on hospital property seeking/in need of examination or treatment for potential **emergency** condition
  - Individual in a hospital-owned/operated ambulance that is not operating under emergency medical services (EMS) direction
  - Individual in a non-hospital owned/operated ambulance on hospital property

What is an Appropriate MSE?

- CMS — "an MSE is the process to reach, within reasonable clinical confidence, the point at which it can be determined whether the individual has an EMC or not."
  - Triage is not an MSE
  - Designation of staff to perform MSEs
  - Consistency/non-discriminatory — the MSE must be the same MSE performed on any other individual presenting with the same signs and symptoms
  - Rules for OB are the same as ED
  - Includes any request in the ED for pharmacy services
  - Documentation

What is an EMC?

- Medical condition (including severe pain, psychiatric disturbances or chemical dependency abuse) manifesting itself by acute symptoms of sufficient severity so that the absence of immediate medical attention could reasonably be expected to result in —
  - Placing the health of the patient (or an unborn child) in serious jeopardy; or
  - Serious impairment of bodily functions; or
  - Serious dysfunction of any bodily organ or part
- A pregnant woman having contractions if there is inadequate time for a safe transfer to another facility or the transfer will pose a threat to the health of the mother or the unborn child

What is Stabilizing Treatment?

- Applies to all individuals who present for exam with an EMC
  - Regardless of ability to pay or insurance authorization
- Similar to others with like presentations
  - But tailored to individual patient needs
- Within capabilities and capacity of the hospital
  - Capabilities:
    - Staff – qualified personnel acting within the training and scope of practice of their professional licenses. Includes the use of on-call physicians and other professionals
    - Facility – specialized services, space, equipment and supplies
  - Capacity:
    - Available beds, staff and equipment-services
    - Space made available in excess of usual capacity to accommodate patients

What is Stabilizing Treatment? (Cont'd)

- Qualified medical personnel (QMP) determine the treatment needed to stabilize EMC
- Include use of on-call physicians
  - And whether they have to present in person
- QMP also determines if transfer is needed in order to stabilize
- Care continues prior to transfer
  - Within capabilities and capacity of the sending hospital

Stable vs. Stabilized

- If the EMC has been stabilized, the patient is ready for discharge home
- "Clinically stable" does not necessarily mean the EMC is stabilized , per EMTALA
  - Patient may be "clinically stable" but the EMC continues to exist
- If the EMC has not been stabilized, the patient is not ready for discharge home
  - Preventing further deterioration of the EMC prior to transfer is required but does not mean the EMC is stabilized
  - If the patient needs ongoing treatment to stabilize the EMC, the EMC cannot be determined as stabilized

Inpatients

- The EMTALA obligations are terminated when an individual is admitted for inpatient care
- An “inpatient” is “a person who is has been admitted to a hospital for bed occupancy for purposes of receiving inpatient hospital services”
- Inpatient status includes admitted patients who are “boarded” in the ED waiting for a bed
- EMTALA obligations are also terminated when a mother has delivered her baby and the placenta

What is an Appropriate Transfer?

- A transferring hospital must meet the following standards for making an "appropriate" transfer under EMTALA:
  - A receiving hospital/physician has accepted the transfer
  - Medical records are sent to the receiving facility
  - The patient has an EMC that has not been stabilized and the resources needed to do so are not available at the treating hospital
  - A physician has certified that the clinical benefits of the transfer outweigh the risks or the patient has made informed request for the transfer
  - An appropriate level of transport (including personnel and equipment) is selected

When must a hospital accept a transfer?

- A hospital is required to **accept** an "appropriate" transfer from a transferring hospital if all of the following exist:
  - The patient presented to the sending hospital seeking or in need of emergency care and treatment
  - The patient has an EMC that is not stabilized
  - The sending physician has determined that the patient requires further examination and treatment in order to stabilize the EMC
  - At the time of transfer, the sending hospital does not have the capability/capacity to stabilize the EMC
  - The receiving hospital has the capability and capacity to stabilize the patient's EMC

Do not forget …

- EMTALA applies only to emergency patients who have an EMC —
  - Inpatient transfers are not covered by EMTALA!
  - An emergency patient with a stabilized EMC, as determined by the sending physician, is not covered by EMTALA

Sticky Issue — Registration

- EMTALA — hospitals may follow reasonable registration processes, including asking for insurance, so long as the inquiry does not delay screening or treatment
- California law — "Emergency services and care shall be rendered without first questioning the patient or any other person as to his or her ability to pay therefor."
- Which law prevails? EMTALA does not preempt state laws that do not directly conflict with EMTALA

Sticky Issue — Psychiatric Emergency Services

- Dedicated Regional Psychiatric Emergency Services
  - Alameda Model
- Goal is to quickly stabilize psych EMCs and decompress hospital EDs
  - Police and EMS transport individuals directly to centers, pre-hospitals
  - Patients can be transferred from the EDs
  - Limited length of stay
  - May or may not require insurance
  - Relatively new service option
  - Not a Medicare provider or supplier
    - May participate in Medicaid

Obligation to Report an EMTALA Violation

- A basic commitment to the provider agreement
- Reasonable belief that a hospital has received a patient from another hospital in violation of EMTALA
- May call CMS or CDPH
- Report should be made with 72-hours

Scenarios

- Medical Screening Examinations
- Appropriate Transfer Requirements
- Stabilizing Treatment

Scenario 1

- A 28 year old female presented to hospital A at 01:45 with leaking fluid she was gravida 4 with 3 prior live births at approximately 33 weeks
- She admitted being a regular methamphetamine user, with last usage 15 minutes prior
- Vital signs at 01:50 were: Temperature 98.1, blood pressure and pulse were not recorded
- Her vaginal fluid tested positive amniotic fluid, consistent with premature rupture of membranes
- Fetal heart tones at 125 and she had no contractions. Fetal monitor showed no distress
- OB physician was called at 02:50. At 02:54 the patient was discharged by orders received from the doctor and told to go directly to hospital M. The medical records states "No" under "D/C against Medical Advice." There is also documentation that the patient requested to leave and go to hospital M.

Scenario 1

- Was the Medical Screening Exam (MSE) Appropriate?
- Did the patient have an Emergency medical condition (EMC)?
- Appropriateness of Transfer?
- Is there any specific concerns about the quality of care rendered to the individual?

Scenario 2

- Peet Hospital is a small hospital that has general surgery, orthopedics, OB and general medicine medical staff available
  - Patient A is a 550 pound, morbidly obese 38 year-old female who has a preliminary diagnosis of “acute appendicitis” and requires surgery

Scenario 2

- Peet wishes to transfer Patient A to another facility for the following reasons:
  - It cannot complete all the studies (CT scan) that the general surgeon believes are needed due to the size of Patient A
  - The Peet staff feel that they do not have the capability to manage the patient while in the hospital due to her size (beds, operating room)

Scenario 2

- Plum Hospital is 30 miles away, and has a full bariatric program with all the necessary equipment and facilities to address this population of patients

Capacity and Capability

- CMS has defined both terms at 42 CFR 489.24(d)
  - **Capacity** means the ability of the hospital to accommodate the treatment of the transferred individual; it encompasses number and availability of qualified staff, beds and equipment and the hospital's past practices of accommodating patients in excess of its occupancy limits
  - **Capability** means that there is physical space, equipment, supplies and specialized services that the hospital provides, and level of care the personnel can provide, including on-call rosters

Scenario 2

- Does the transfer implicate EMTALA?
- What is Peet's responsibility to meet the needs of this patient?
- Does Plum have to accept this patient?

Knowledge Checks

At what point is it permissible for the hospital to seek authorization from an individual's insurance company for medical screening or stabilization services?

A. As soon as the individual signs in to the ED registration desk

B. After triage but before the MSE

C. Immediately after the MSE has been performed

D. After the MSE has been performed…and the hospital has initiated any further medical examination and treatment that may be required to stabilize the emergency medical condition

Knowledge Checks

A patient presents to the ED complaining of epigastric pain radiating to her left shoulder and jaw along with shortness of breath and dizziness. She is triaged as an ESI level 2, but then waits for 4 hours before leaving and going to another ED for care. What EMTALA requirement is most likely out of compliance?

A. Medical Screening Examination
B. Delay in Examination or Treatment
C. Stabilizing Treatment
D. Appropriate Transfer
E. A and C

Knowledge Checks

A patient in the ED is diagnosed with a probable bowel perforation post colonoscopy. The ED doctor contacts the surgeon on call. The surgeon states she'll come to the ED as soon as the ED doctor verifies insurance coverage and obtains authorization for surgery. What EMTALA requirements is most likely of compliance?

A. Medical Screening Examination
B. On-Call Physicians
C. Stabilizing Treatment
D. Delay in Examination or Treatment
E. B and D

Knowledge Checks

When does a hospital's EMTALA obligation end?

A. The patient is admitted for stabilizing treatment
B. The patient with a stabilized EMC is discharged home with outpatient follow-up
C. The patient with an EMC is transferred to a hospital with specialized services for stabilizing treatment
D. None of the above
E. All of the above

Knowledge Checks

Which transfer exceptions must be met in order for a hospital to transfer an individual with an un-stabilized EMC?

A. The individual has ambulance insurance to cover the transfer
B. The individual requests a transfer or the physician (or other QMP) certifies that medical benefits expected from medical treatment at another hospital outweigh increased risks of being transferred
C. The transfer is an “appropriate transfer”
D. B and C

Knowledge Checks

A post-op tonsillectomy patient is bleeding, and calls an ambulance from home. The ED doctor determines the patient has an EMC, needs to go back to surgery urgently, and calls the patient's surgeon. The surgeon instructs the ED physician to transfer her patient to the hospital where she has privileges. Since the surgeon is requesting the transfer, the sending hospital doesn't have to meet the appropriate transfer requirements.

A. True
B. False

Questions & Answers

Sign-in, Evaluations, & Credit Claim

1. Go to eeds.com

2. Sign-in and enter Activity Code

Tuesday, 4/23: 14mity

Wednesday, 4/24: 35show

3. Complete Evaluations and Claim Your Credits *Instantly!*

NEED SOME HELP: See staff at registration desk OR call 559-724-4450

THE COMMITTEE ON TRAUMA

40 YEAR ATLS® ADVANCED TRAUMA LIFE SUPPORT ANNIVERSARY

The Committee on Trauma
CA State Trauma Summit, April 23 2019

Daniel R. Margulies, MD FACS

Chair, Verification Review Committee, ACS Committee on Trauma

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality:
Highest Standards, Better Outcomes
100+years

THE COMMITTEE ON TRAUMA

40 YEAR ATLS® ADVANCED TRAUMA LIFE SUPPORT ANNIVERSARY

- ACS Committee on Fractures (1922)
- Renamed by BOR as The Committee on Trauma 1950
- 100th Anniversary 2022!

Charles L. Scudder, MD

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality:
Highest Standards, Better Outcomes
100+years

The Problem

- More deaths in children than all other causes combined.
- More than 130,000 Americans die every year
- Health care costs + lost productivity = $676 billion/year
- Most important problem of our children and uniformed service personnel

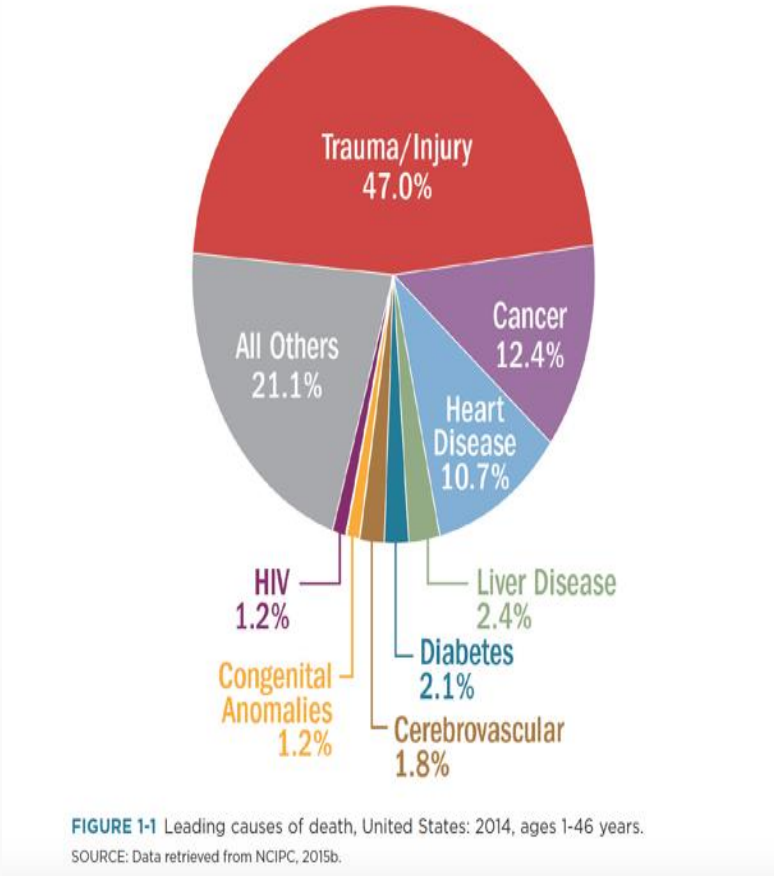
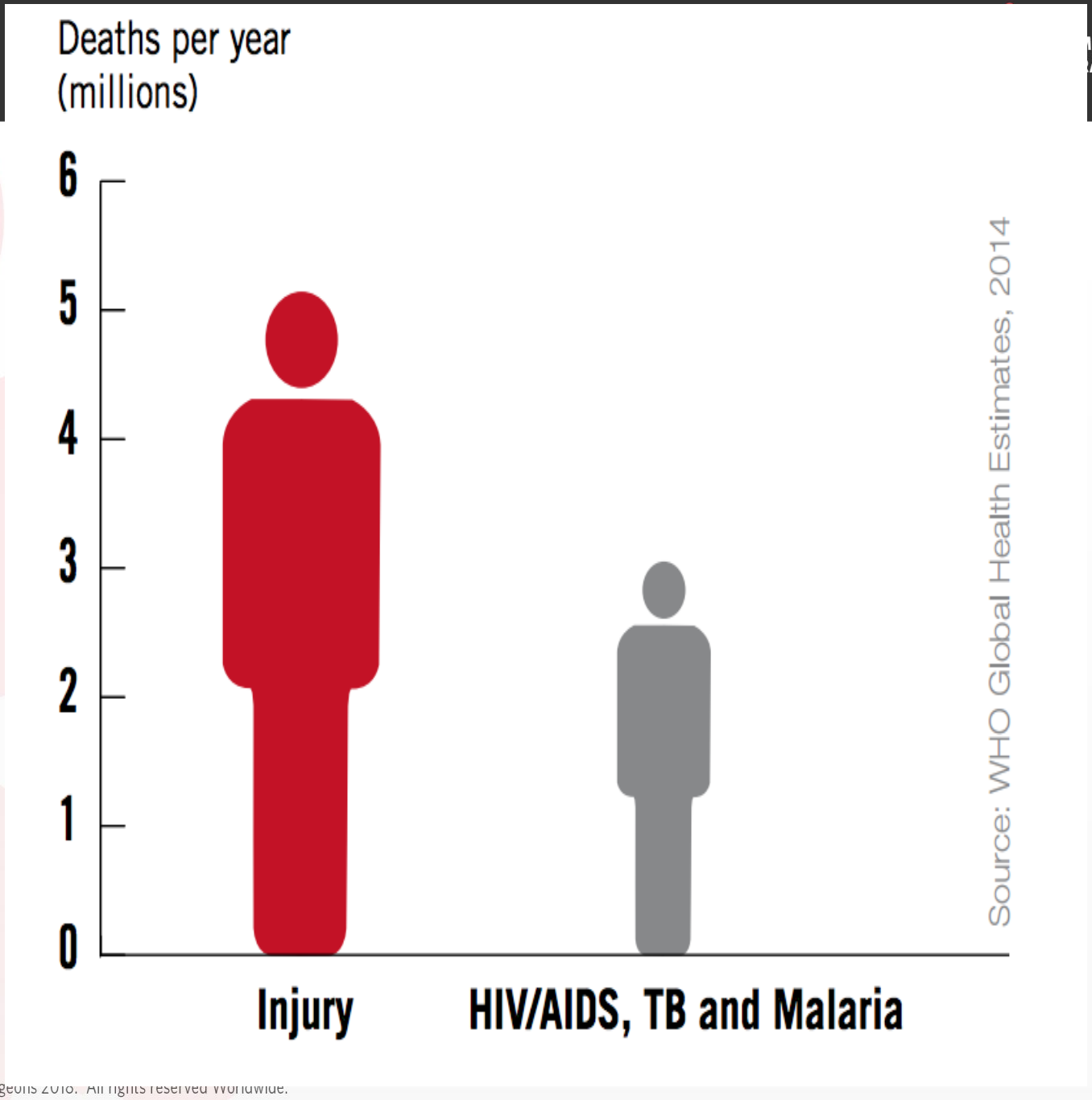


FIGURE 1-1 Leading causes of death, United States: 2014, ages 1-46 years.
SOURCE: Data retrieved from NCIPC, 2015b.



TRAUMA SYSTEMS Consultation Program

ACS tqip TRAUMA QUALITY IMPROVEMENT PROGRAM

ATLS® ADVANCED TRAUMA LIFE SUPPORT

THE COMMITTEE ON TRAUMA

40 YEAR ATLS ADVANCED TRAUMA LIFE SUPPORT ANNIVERSARY

ATOM ADVANCED TRAUMA OPERATIVE MANAGEMENT

ASSET ADVANCED SURGICAL SKILLS FOR EXPOSURE IN TRAUMA

STOP THE BLEED℠ SAVE A LIFE

VRC VERIFICATION REVIEW CONSULTATION for excellence in trauma centers

rttdc RURAL TRAUMA TEAM DEVELOPMENT COURSE

NTDB NATIONAL TRAUMA DATA BANK

TEAM Trauma Evaluation and Management

AMERICAN COLLEGE OF SURGEONS Inspiring Quality: Highest Standards, Better Outcomes

100+years

BLEEDINGCONTROL.ORG

PHTLS HOSPITAL TRAUMA LIFE SUPPORT NAEMT®

Committee on Trauma

>100 Committees on Trauma

- National Committee on Trauma - 100 members
- 10 US regions
  - 57 Committees on Trauma
- 2 Canadian regions
  - 8 Provincial Committees
- 1 Military region
  - 5 Committees on Trauma
- 4 International regions
  - Multiple Country committees on Trauma
- Approximately 3,500 members total

US & Canada Regions

THE COMMITTEE ON TRAUMA

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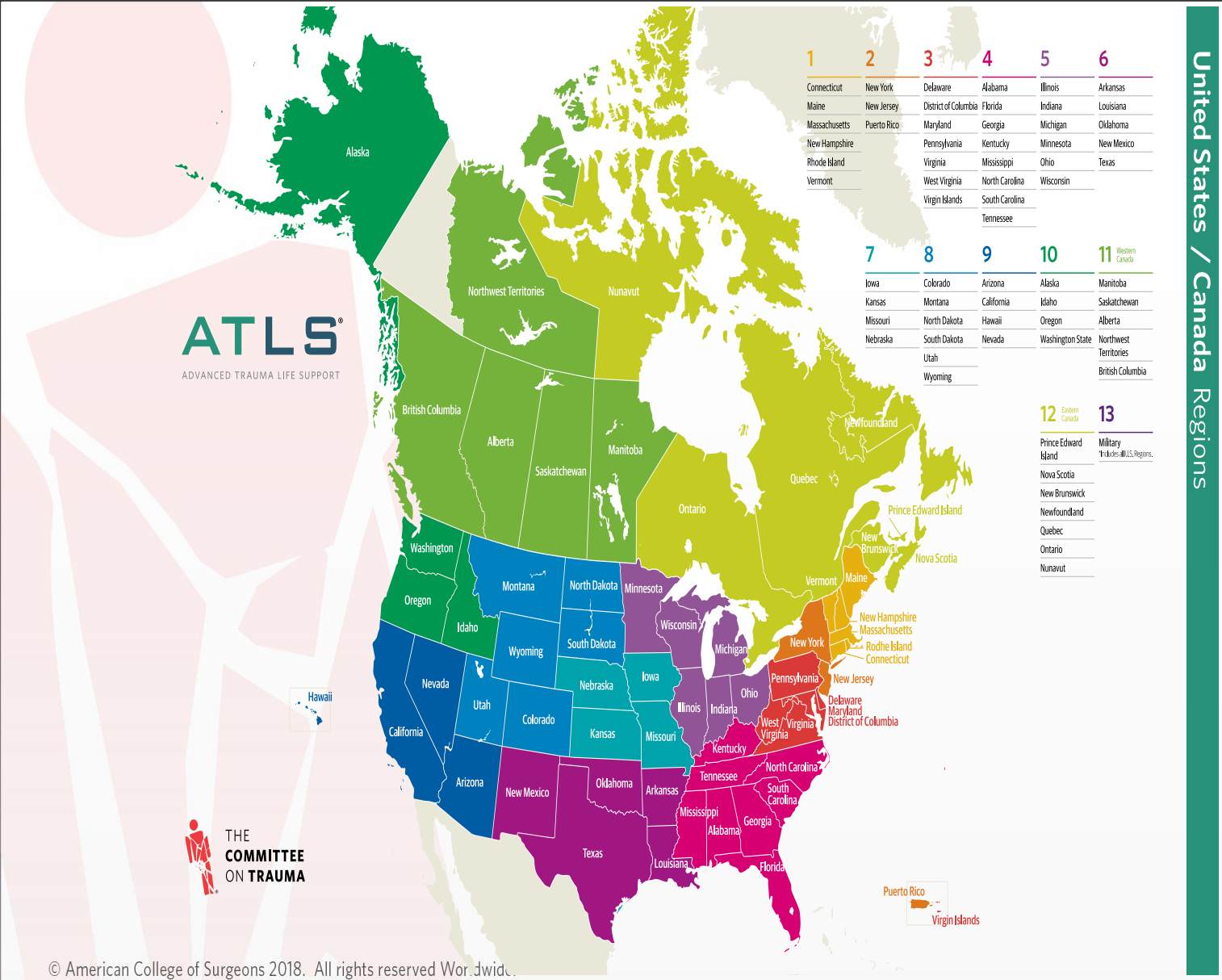
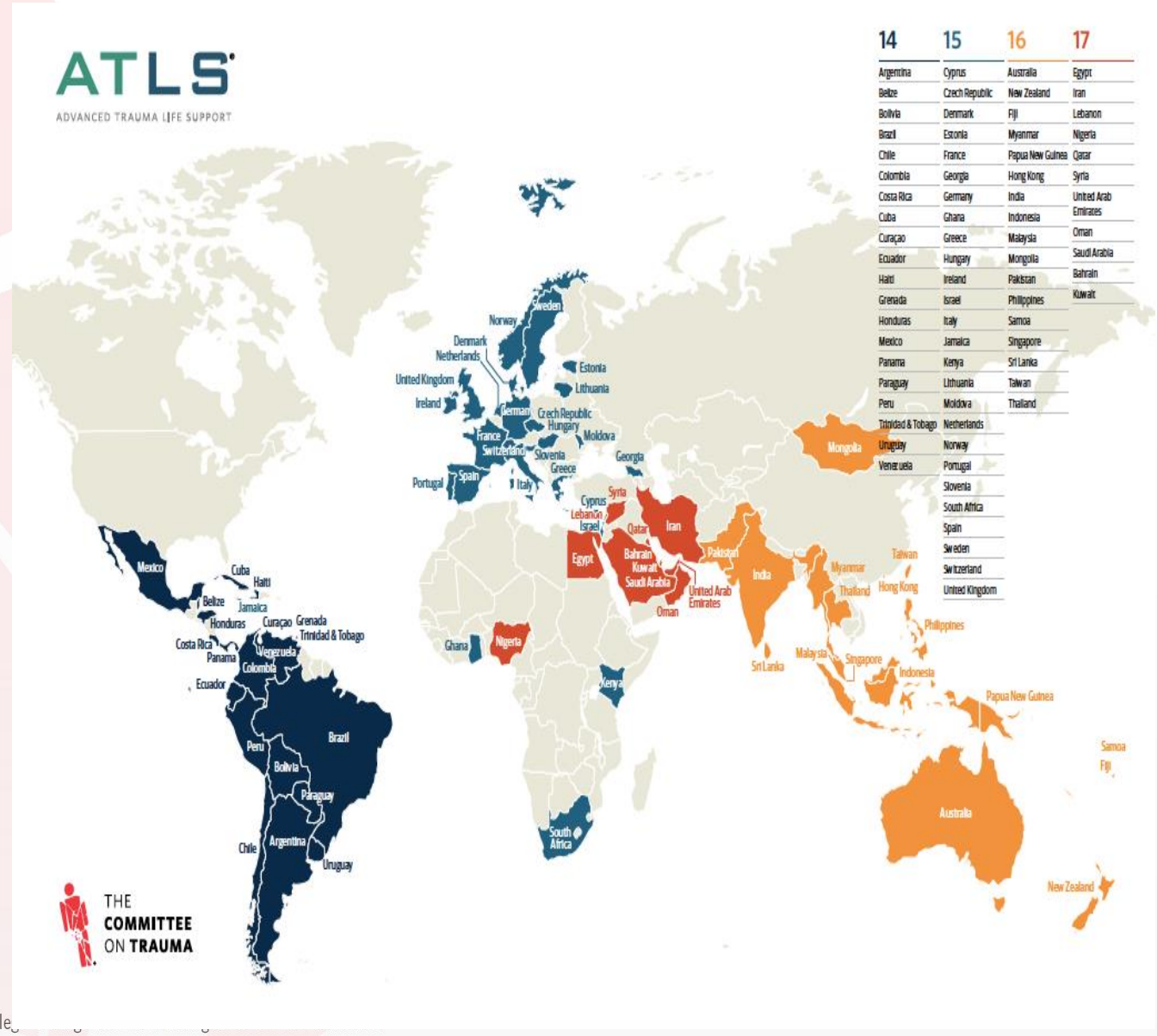


International Regions



ACS – Committee on Trauma 2018

COT Mission & Vision

- Vision: *Eliminate preventable deaths and disabilities across the globe by preventing injury and improving the outcomes of trauma patients*

- The Mission of the COT is to develop and implement programs that support injury prevention and ensure optimal patient outcomes across the continuum of care. These programs incorporate advocacy, education, trauma center and trauma system resources, best practice creation, outcome assessment, and continuous quality improvement.

Tag line: ***Eliminate preventable death and disability from injury across the globe***

Pillars of a Modern Trauma System

- Prevention
- Acute Care
  - Bystander intervention
  - Communications systems
  - EMS
  - Trauma Centers
- Rehabilitation
- Framework for Emergency Care Systems & Disaster Preparedness

Requires timely, structured cooperation and communication.

Future Trauma Leaders Program

THE COMMITTEE ON TRAUMA

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- Immersion experience in COT activities
- Junior faculty
- Four participants/ year
- Mentorship
- Early engagement in COT

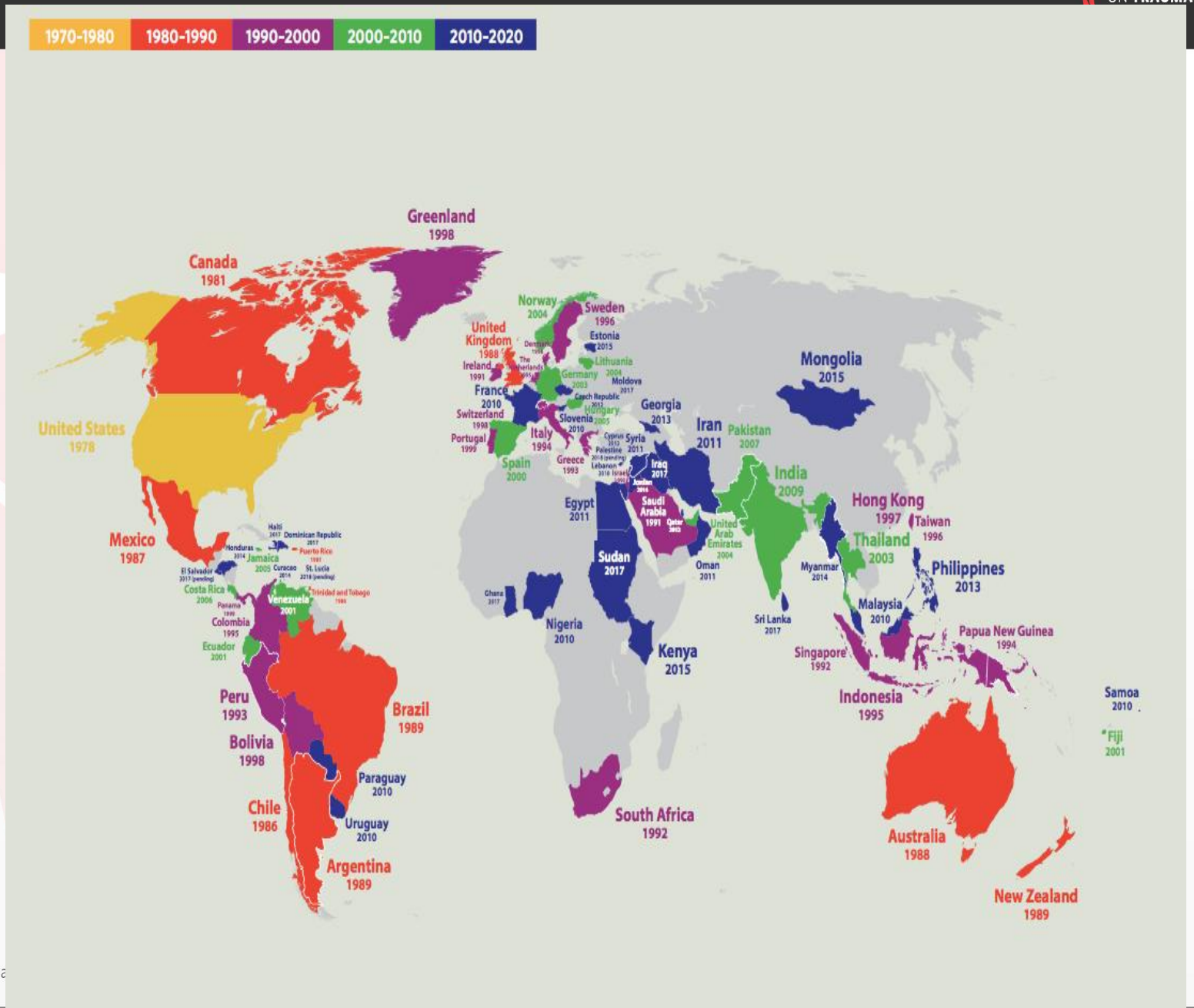
Pillar Overviews

- Education
- Trauma Center Quality
- Trauma System Quality
- Injury Prevention/ Advocacy

Education Pillar

- ATLS/TEAM
  - 10th edition roll out
  - 40th Anniversary 2018
  - Revising TEAM for Medical Students
  - Developing modular educational approach for low resource environments
- RTTDC: New edition
- DMEP: New edition
- Stop the Bleed
- Trauma Skills courses under revision

ATLS Across the Globe



STOP THE BLEED℠

SAVE A LIFE

THE COMMITTEE ON TRAUMA

40 YEAR ATLS® ADVANCED TRAUMA LIFE SUPPORT ANNIVERSARY

Bleeding Control and the American College of Surgeons Commitee on Trauma

What Everyone Should Know to Control Bleeding

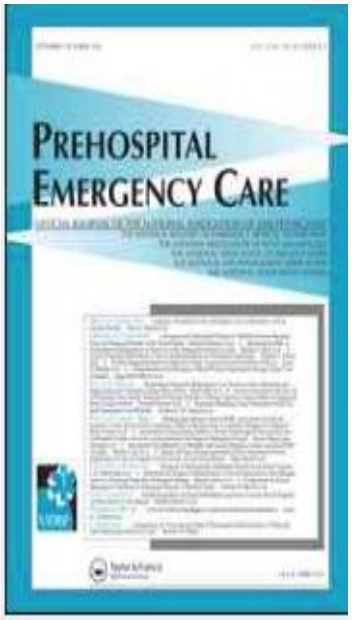
V. 2

Research article

An Evidence-based Prehospital Guideline for External Hemorrhage Control: American College of Surgeons Committee on Trauma

Eileen M. Bulger, MD, FACS, David Snyder, PhD, Karen Schoelles, MD, FACP, Cathy Gotschall, ScD, Drew Dawson, BA, Eddy Lang, MD, CM CCFP (EM) CSPQ, Nels D. Sanddal, PhD, NREMT, Frank K. Butler, MD, FAAO, FUHM, Mary Fallat, MD, FACS, Peter Taillac, MD, Lynn White, MS, CCRP, Jeffrey P. Salomone, MD, FACS, NREMT-P, William Seifarth, MS, NREMT-P, Michael J. Betzner, MD, FRCPC, Jay Johannigman, MD, FACS & Norman McSwain Jr., MD, FACS, NREMT-P

- Published 2014
- Pre-hospital guidelines for external hemorrhage control



The Hartford Consensus

>4000 TWEETs/mo #StopTheBleed

THE COMMITTEE ON TRAUMA

40 YEAR ATLS ADVANCED TRAUMA LIFE SUPPORT

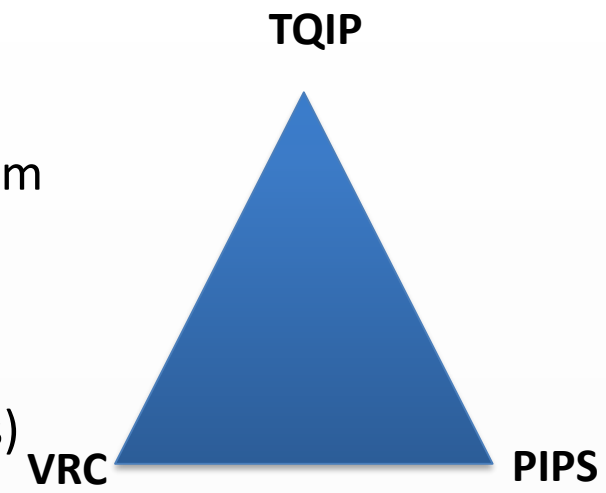
Current Status: Stop the Bleed

- 37,000 registered instructors
- All 50 states and 77 Countries
- >500,000 students taught
- Website views: 1,309,000, Twitter followers: 4,504.
- Multiple State & Federal lobbying efforts
    - Georgia > $3 million to equip all public school
- Research Agenda meeting in February
- Version 2 Course in development

http://www.bleedingcontrol.org

Integrated Trauma Quality Prog

- Verification
  - Optimal Care Document revision 2018/19
  - Feedback from end users
  - Developing enhanced consultation program
- Performance Improvement-Patient Safety
  - Model PI Program in final stages
  - Society of Trauma Nurses Partnership
  - Collaborative Best Practices (EAST, STN, others)
- TQIP
  - Enhancing data quality
  - Data linkage project



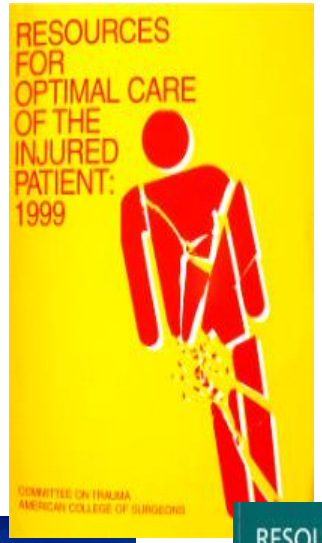
COT VRC Model

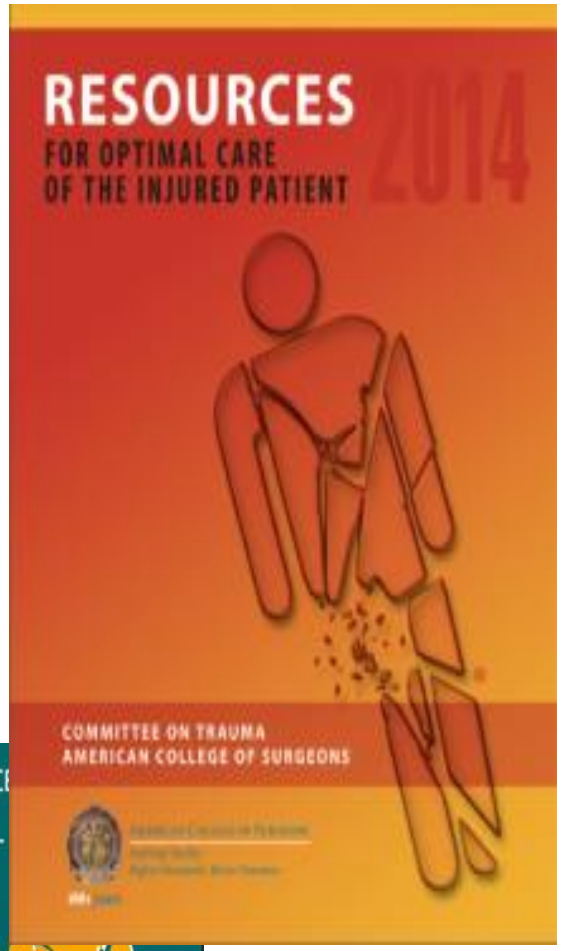
- Set relevant high standards
- Build and insure the right infrastructure, leadership and processes aimed at improving quality and reducing mortality.
  - People
  - Facilities
  - Resources
- Risk adjusted *clinical data* for performance improvement
- Implement a Verification Process by practicing clinical experts

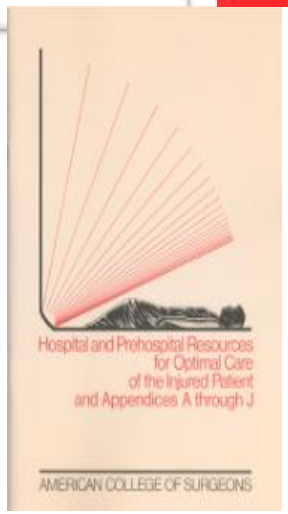
546 ACS Verified Trauma Centers, >800 TQIP centers

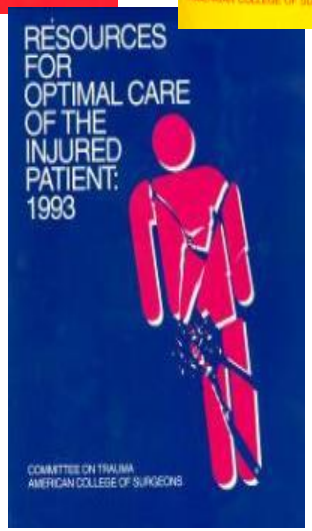
Evolution of Verification

Resources for Optimal Care of the Injured Patient: 1976-2014









The Committee on Trauma

VRC VERIFICATION REVIEW CONSULTATION
for excellence in trauma centers

New York Case study

- NY developed a Trauma system in 1990 (with a HRSA Grant)
- Bought a trauma specific registry (Truama One—Lancet Technologies) to be used by all trauma centers
- Criteria were developed using the then current edition of the Resources Document
  - --watered down to fit the existing hospital that provided trauma care.
- The DOH accepted application for “Regional” (level I equivalents) vs. “Area” (level II equivalents) that were also watered down.

New York Case study

- The reason given then was that some of the COT criteria were …too stringent to fit New York.
- *(basically resulting in every hospital that applied being accepted)*
- The Regional and Area centers were to gather data from the community hospitals in their region.
- The state funded the TPM and registrars.
- The DOH did reviews using reviewers from a different section of the state.
- The consistency of the verification visits varied widely and deficiencies were not followed up.

New York Case study

- At this time, the NYC center data was not collected or analyzed by the state.
- The first state report was 1990.
- The NYC data was not collected until the late 1990's. Not all hospitals were verified.
- The DOH did not have the staff or enough money to verify all of the centers. Eventually, the HRSA grant expired.
- Funding for the trauma registries, TPM and registrars ceased.
- The DOH tried to keep the system afloat with money from the Dormitory Fund until the Comptroller got wind of this.
- Also, a new Governor was elected. The new Commissioner of Health had other priorities. All funding ceased.

New York Case study

- The hospitals had a rapid decrease in trauma staffing.
- The state sponsored registry increased prices.
- Many centers went away from this vendor to other vendors, primarily NTRACS.
- Downloading data to the state was sketchy.
- The state had always had the SPH at the State University at Albany be in charge of data.
- They had used SPARCS (a discharge data set) to compare accuracy of registry data.
- SPARCS data from all hospitals was used to include trauma centers versus non-trauma center outcomes.

New York Case study

- Several hospitals in the Hudson Valley area applied to be Area Trauma Centers.
- None of the hospitals had the necessary infrastructure.
- A review panel from the State Trauma Advisory Committee recommended that only one application out of 4 be given provisional designation.
- The DOH, with pressure from the Governor's Office, designated all 4 centers.
- Subsequently, a hospital in the Bronx applied, was reviewed and given status as a Regional Trauma Center.
- This hospital was directly between 2 long standing trauma centers. They subsequently lost trauma volume.
- After this, the DOH was asked to review all of the trauma centers in NYC. This found that many hospitals did not meet state criteria.
- They were given time to correct the deficiencies, however, no follow up visits occurred.

New York Case study

- A paper survey of all pediatric trauma centers was then conducted. This showed that the centers did not meet the state standards.
- Revision of the state standards began in 2001 after the destruction of the World Trade Center.
- Progress was made but it was not fast enough and was marginally supported by the DOH due to funding constraints.
- This was disbanded in 2004. Progress was made but the meetings were too infrequent. Nothing came of the process. At this time, the lack of current standards and a process for continued verification was felt to be blocking appropriate trauma center development.

New York Case study

- Serious discussion at the STAC (State Trauma Advisory Committee) centered on the DOH supporting the revisions, regular verification visits and a process which noncompliance could be removed.
- The DOH was not enthusiastic. A proposal to use the VRC verification process was introduced.
- There was a lot of controversy. Some TMDs were concerned that the cost was too high and not financially supported by the state. Some TMDs were concerned because they knew their center did not meet COT standards and they were concerned for their job.
- NYC public hospitals did not believe that HHC would fund their center for verification.
- Finally, the DOH decided to proceed with the VRC verification process.

New York Case study

- This has led us to where we are today. All of the trauma centers are required to be verified by the VRC before the DOH will designate the hospital as a trauma center.
- The trauma centers are still required to download data to the state. The state has the ability to receive downloads from Trauma 1, TRACS and Image Trend.
- The state uses Image Trend for their registry.
- The DOH through its EMS committees now requires trauma patients to preferentially go to trauma centers.
- The Pediatric Trauma Centers have asked the state to support the pediatric trauma/emergency care criteria on patient destination.
- All of the trauma centers are verified, participate in TQIP and many of the Level I and II's participate in the state collaborative.

New York Case study

- The DOH has not released a state report from 2015 and later. They are still analyzing state data submissions.
- They are now considering a State Consultative System visit. They believe they know where centers are needed and where they are not. An outside consultation should provide the DOH with data from outside reviewers to help identify these areas of the state.
- My comments: everyone knows it is costly to be a trauma center so the state needs to have reasons to entice hospitals to be a trauma center and needs a method to avoid designating too many trauma centers in given areas.
- Lessons we might learn from…

TQIP Best practices

THE COMMITTEE ON TRAUMA

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Comprehensive imaging guideline JUST RELEASED!!

Non-accidental Trauma

- Pediatrics
- Geriatrics
- Domestic violence

east
Eastern Association for the Surgery of Trauma
Advancing Science, Fostering Relations

ACS tqip TRAUMA QUALITY IMPROVEMENT PROGRAM

STN SOCIETY OF TRAUMA NURSES

OTA ORTHOPAEDIC TRAUMA ASSOCIATION

Focus on Long term functional outcome…

- Multidisciplinary Long term outcomes task force
- Consensus Conference Jan 2019
- Research Agenda: NTRAP
- New Liaisons and joint projects with ACRM, NIDLLR

Research Committee

- Develop strategies to optimize use of ACS COT databases for research
- Collaborate with CNTR
- Support development of the National Trauma Research Action plan
- Research agenda for firearm injury prevention
- Mentorship for clinical research scholars
- Identify grant opportunities
- Support VRC in revisions to research requirements for Level I centers

THE COMMITTEE ON TRAUMA

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CNTR

COALITION for NATIONAL TRAUMA RESEARCH

NATIONAL TRAUMA INSTITUTE

east

Eastern Association for the Surgery of Trauma

Advancing Science, Fostering Relationships, and Building Careers

THE AMERICAN ASSOCIATION FOR THE SURGERY OF TRAUMA

THE COMMITTEE ON TRAUMA

Western Trauma Association

NTRAP NATIONAL TRAUMA RESEARCH ACTION PLAN

AIM 1 – Perform a gap analysis of military and civilian trauma research to identify priorities across the continuum of care.

AIM 2 – Define optimal metrics to assess long-term functional outcomes in injured patients following hospital discharge.

AIM 3 – Identify trauma research regulatory barriers, develop best practices for investigators, and collaborate with federal entities to define optimal endpoints for clinical trauma research.

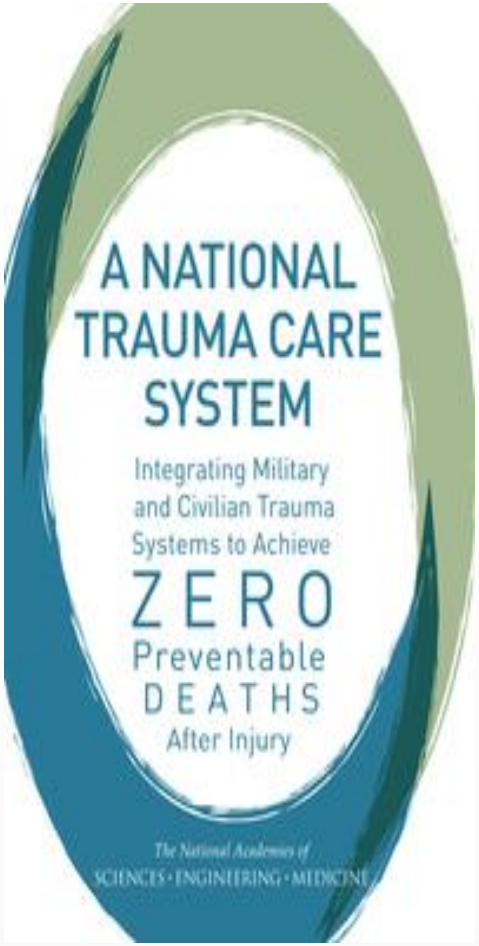
Integrated Trauma System Committees

- Trauma system evaluation, EMS committee, Disaster committee, Rural trauma committee
- Plan to update trauma system consultation program (White book)
- New Military trauma system book in progress
- Revision of Field Triage Guidelines
- Disaster preparedness
  - Tools for trauma center/system preparedness
  - Several collaborative project with ASPR




NASEM Report

- 11 recommendations
- 4 areas
  - Development of a National Trauma System
  - Military-Civilian integration
  - Data flow across the continuum of care
  - Trauma Research



Military-Civilian Integration

- Models to integrate military teams into civilian trauma systems for ongoing training & education
- Adopting lessons learned from combat to civilian environment

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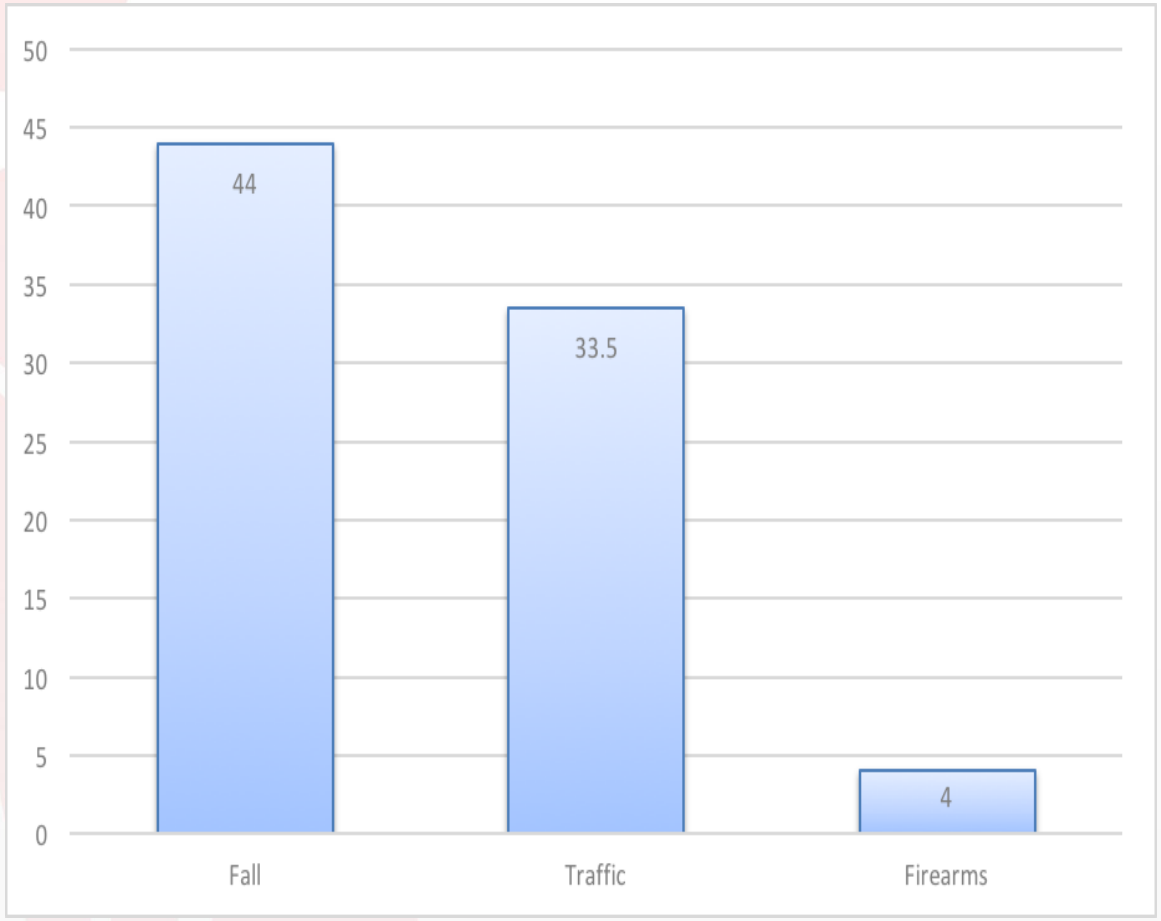
AN EPIDEMIC IN THE US

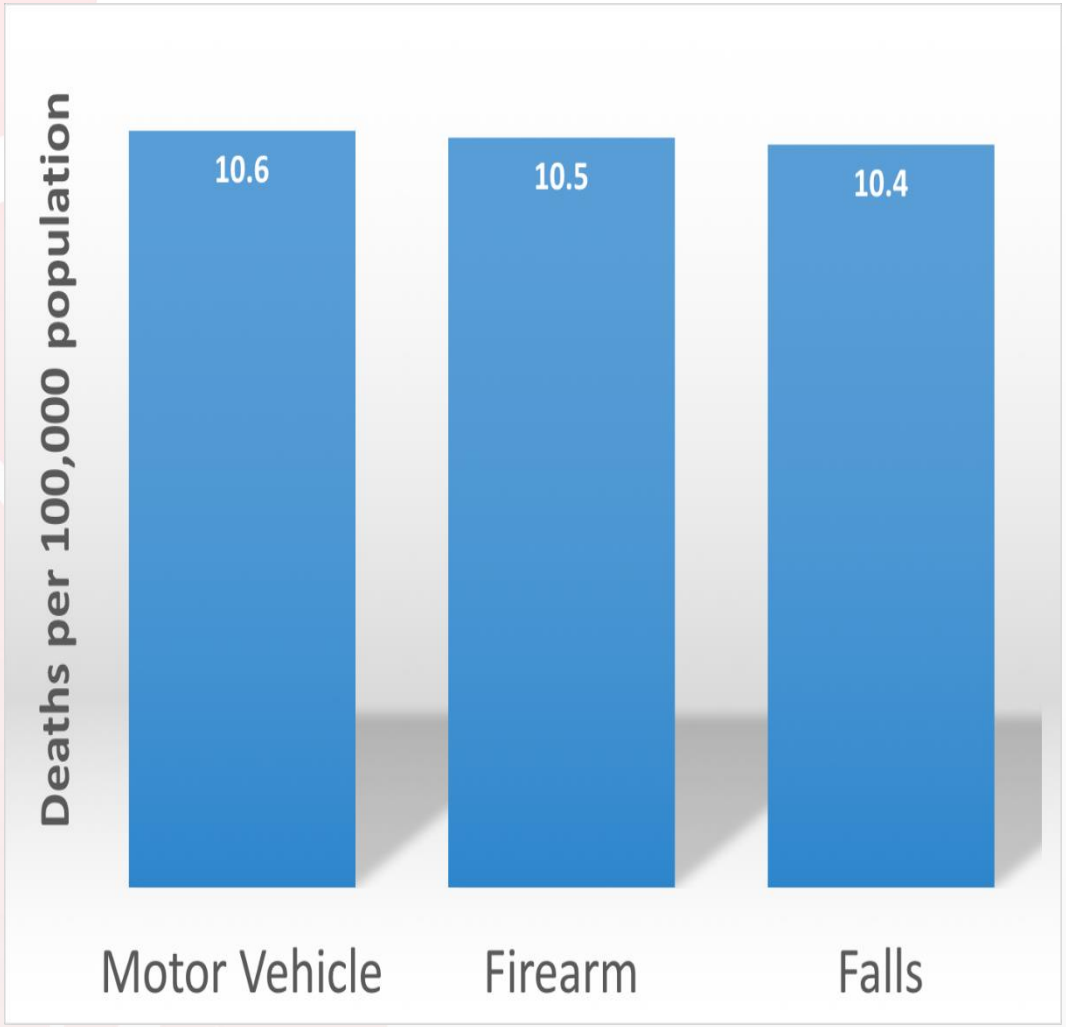
- Las Vegas,NV: Concert
- Orlando, FL: Pulse nightclub
- San Bernadino, CA: Christmas party
- Portland, OR: Shopping mall
- Aurora, CO; Movie Theater
- Virginia Tech
- Sandyhook Elementary
- Boston Marathon Bombing
- Sutherland Springs, TX: Church
- Parkland, FL: High school
- Benton, KY: High school
- Columbine, CO: High school
- Seattle, WA: College
- Marysville, WA: High school
- Roseburg, OR: College

What patients do our trauma centers see?

N = 818,212



What is the overall burden of death?



We have help…

THE COMMITTEE ON TRAUMA

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Pre-Hospital to Emergency Department Data Exchange: A SAFR Transition of Care

Dan Chavez

April 23, 2019

SAN DIEGO

- Population: 3.5 Million
- Larger Region than Connecticut
- 5th largest U.S. County
- 18 municipalities
- 18 tribal nations
- 42 school districts
- Region is very diverse
  - Over 100 languages
  - Large military presence
  - Largest refugee resettlement site in CA
  - Busiest international border crossing in the world

SAN DIEGO HEALTH CONNECT
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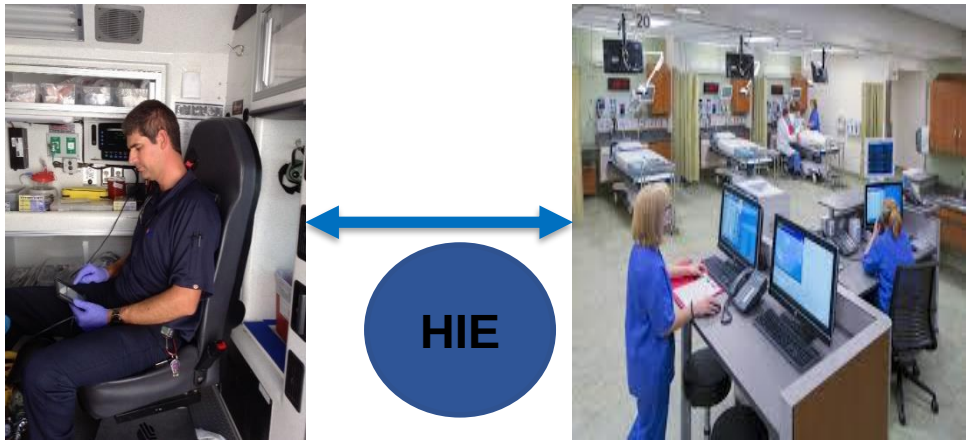
EMS in San Diego County 2018

- Over 240,000 emergency 911 calls
- Over 350,00 responses
- 60 different EMS agencies
  - 40 ambulance companies
- 10,000+ EMTs, Paramedics and Specialized Nurses
- 21 hospitals
  - 15 of 19 non-federal hospitals with EDs
    - 3 of these utilize SAFR
  - 6 Level 1Trauma Centers
  - 16 stroke centers and 13 cardiac centers
  - 7 base hospitals

What is SAFR? Real-time Connection Ambulance to ED



- **SEARCH** – paramedics search HIE pre-hospital
- **ALERT** – real-time data to ED
- **FILE** – electronic submission of medic's report to EHR
- **RECONCILE** – hospital to ePCR, e.g. eOutcomes

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SAFR

SEARCH ALERT FILE & RECONCILE

What is the impact of not doing it?

ED providers will not have access to data that can be available from the community to provide better care.

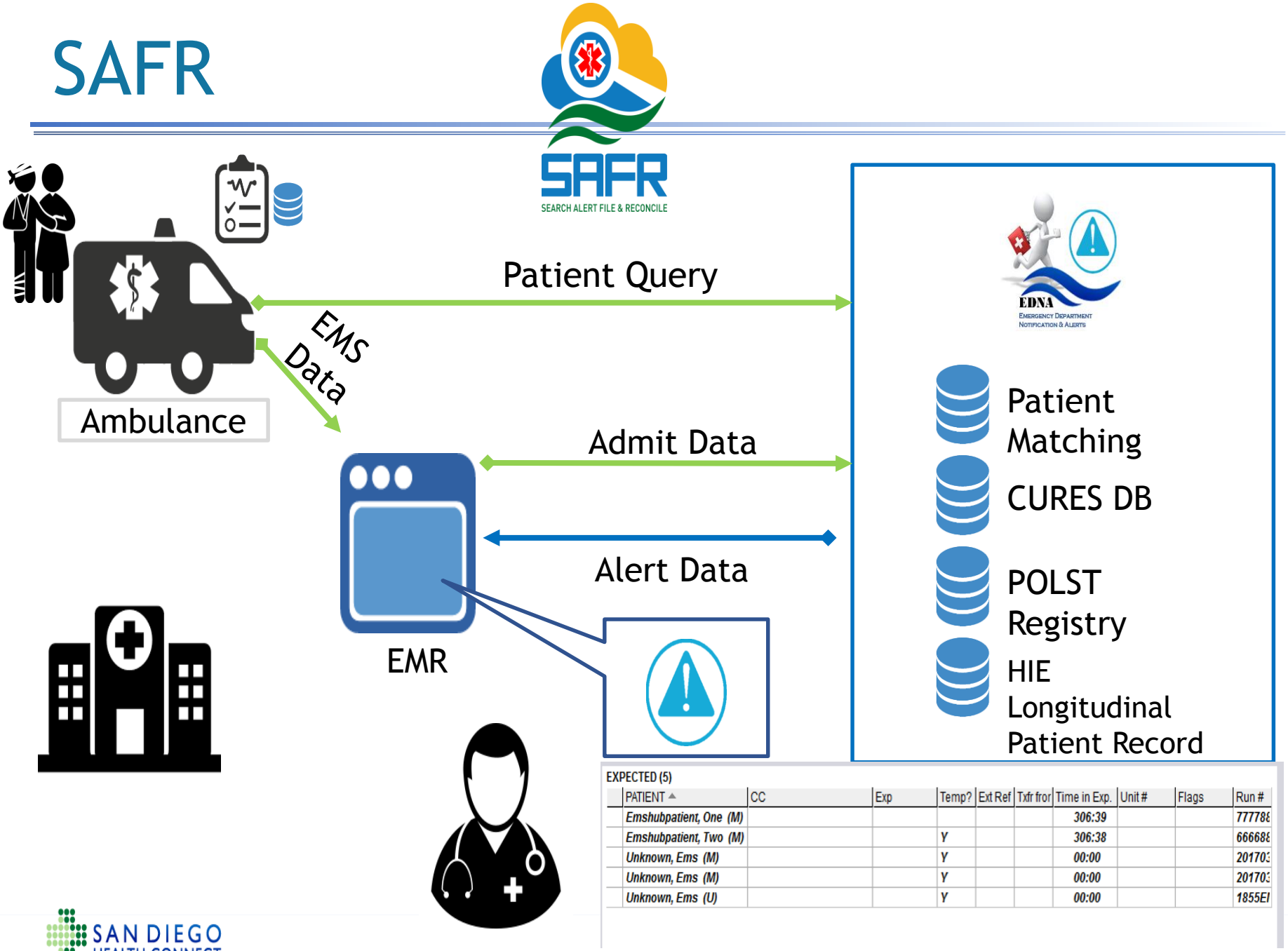
Use Cases

When the paramedic arrives at the patients location and as they performed their assessment, they leverage the HIE to view key medical information, allergies, medications, encounters before they provide treatment. After performing an EKG, the paramedic transmitted the EKG to the target emergency department via SAFR health information technology.
A hospital mobile intensive care nurse viewed the EKG from on the computer screen in the emergency department on the preadmit track board, without having to query they system.

Value

EMS patient information is presented in the emergency department before the EMS arrives at the hospitals. This alerts the providers to critical information that allows them to be prepared and less reactive to the arrival of the patient. This can shorten the transition process to help speed of treatment for the patient on arrival.

SAFR



EXPECTED (5)

PATIENT	CC	Exp	Temp?	Ext Ref	Txfr fror	Time in Exp.	Unit #	Flags	Run #
Emshubpatient, One (M)						*306:39*			*777788*
Emshubpatient, Two (M)			*Y*			*306:38*			*666688*
Unknown, Ems (M)			*Y*			*00:00*			*201703*
Unknown, Ems (M)			*Y*			*00:00*			*201703*
Unknown, Ems (U)			*Y*			*00:00*			*1855EI*

SAN DIEGO HEALTH CONNECT
Better Information • Better Care®

Goal of SAFR

HIE

Save lives & improve care coordination

UCSD and Rady!

AMR/W.A.T.E.R.

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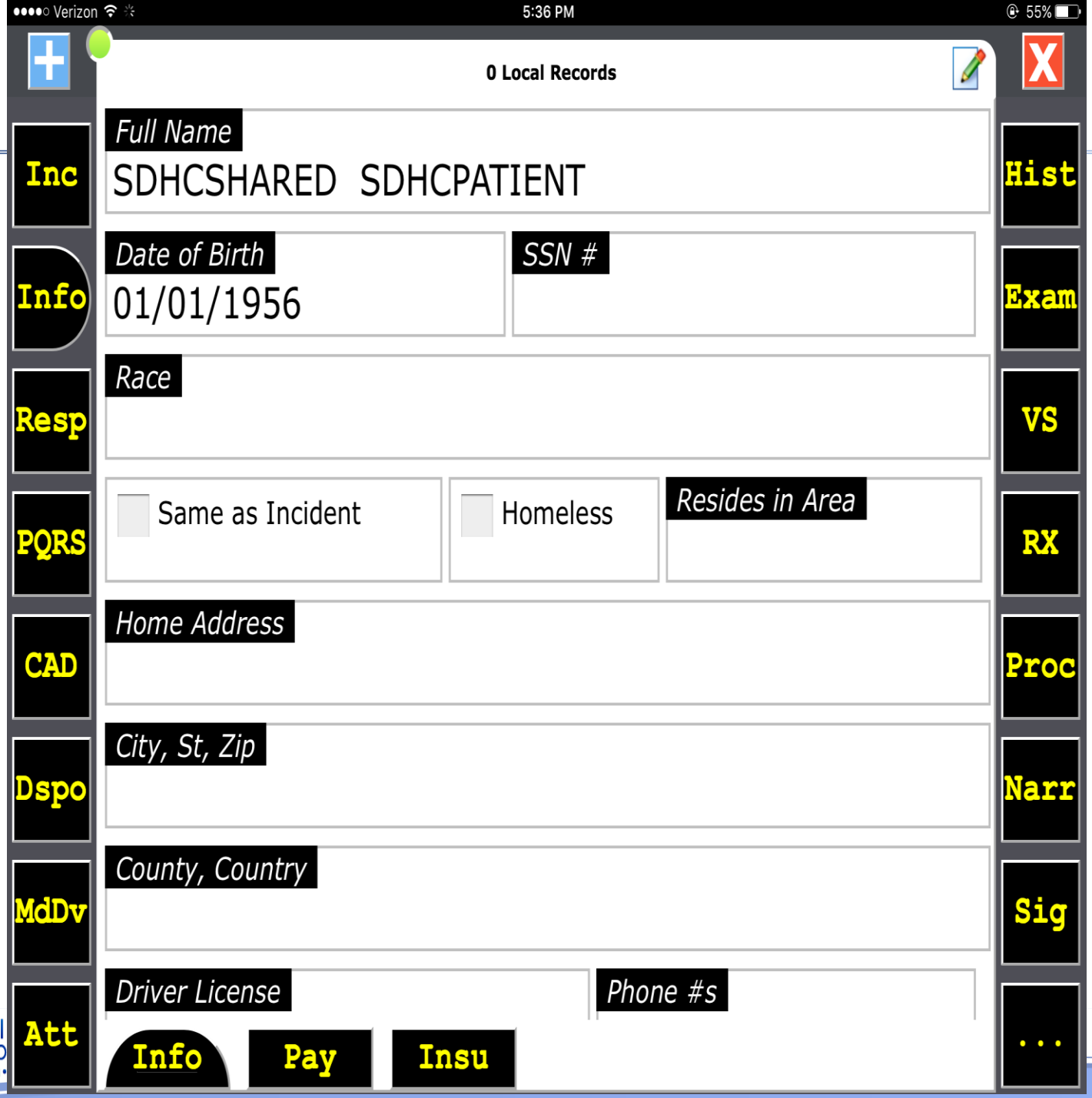
Better Information • Better Care®

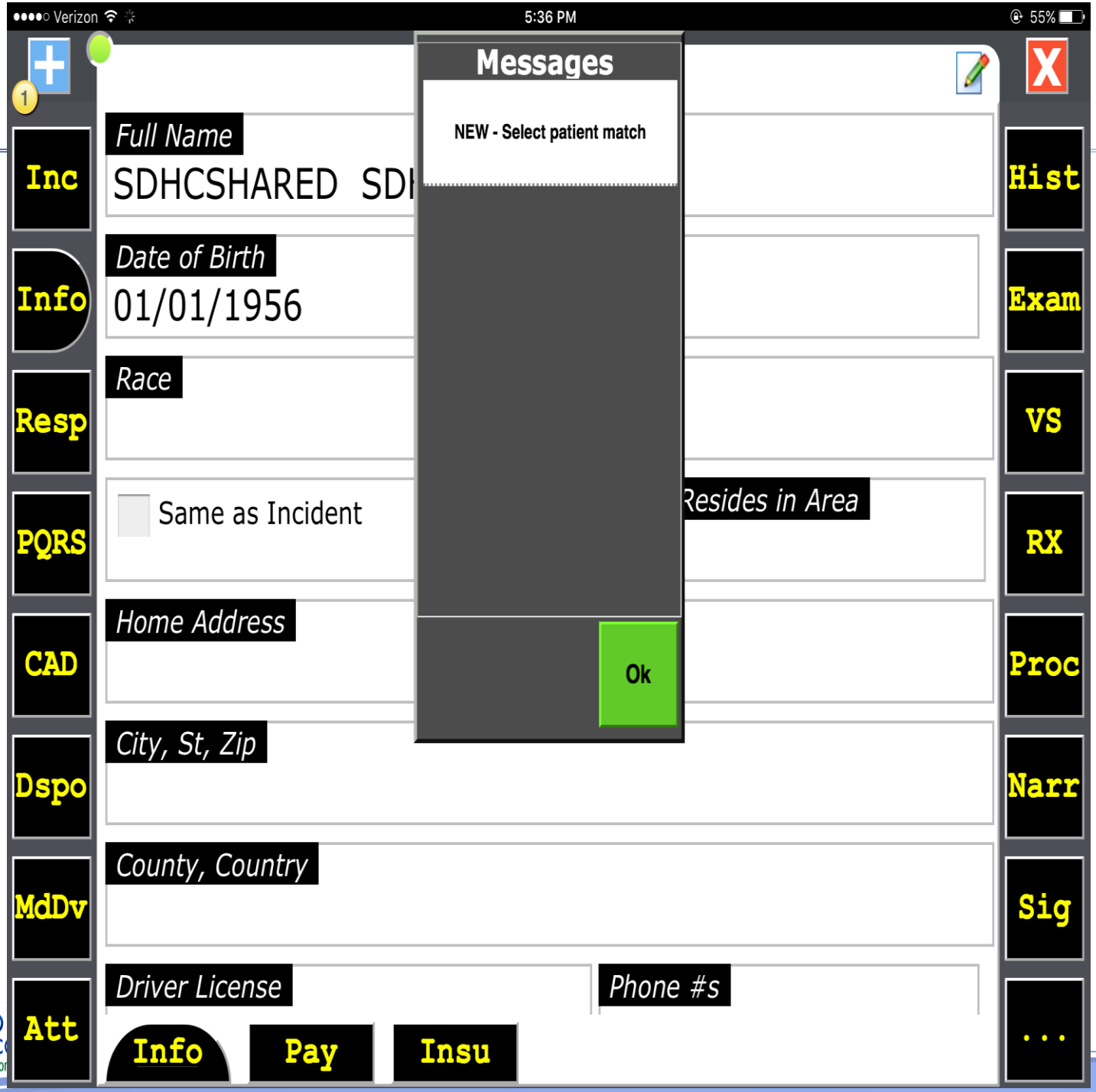
FROM PARAMEDIC'S PERSPECTIVE

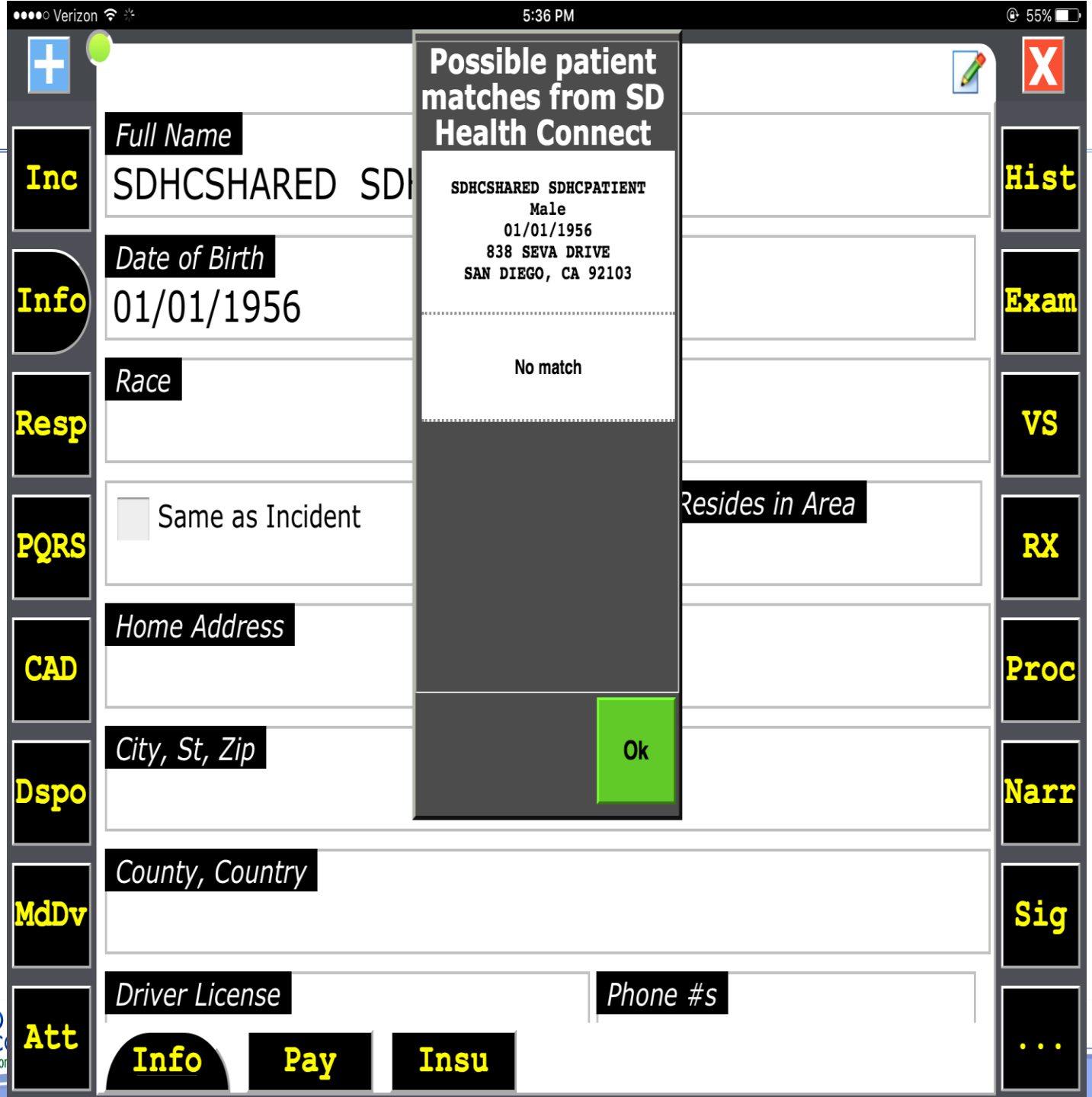
S - SEARCH

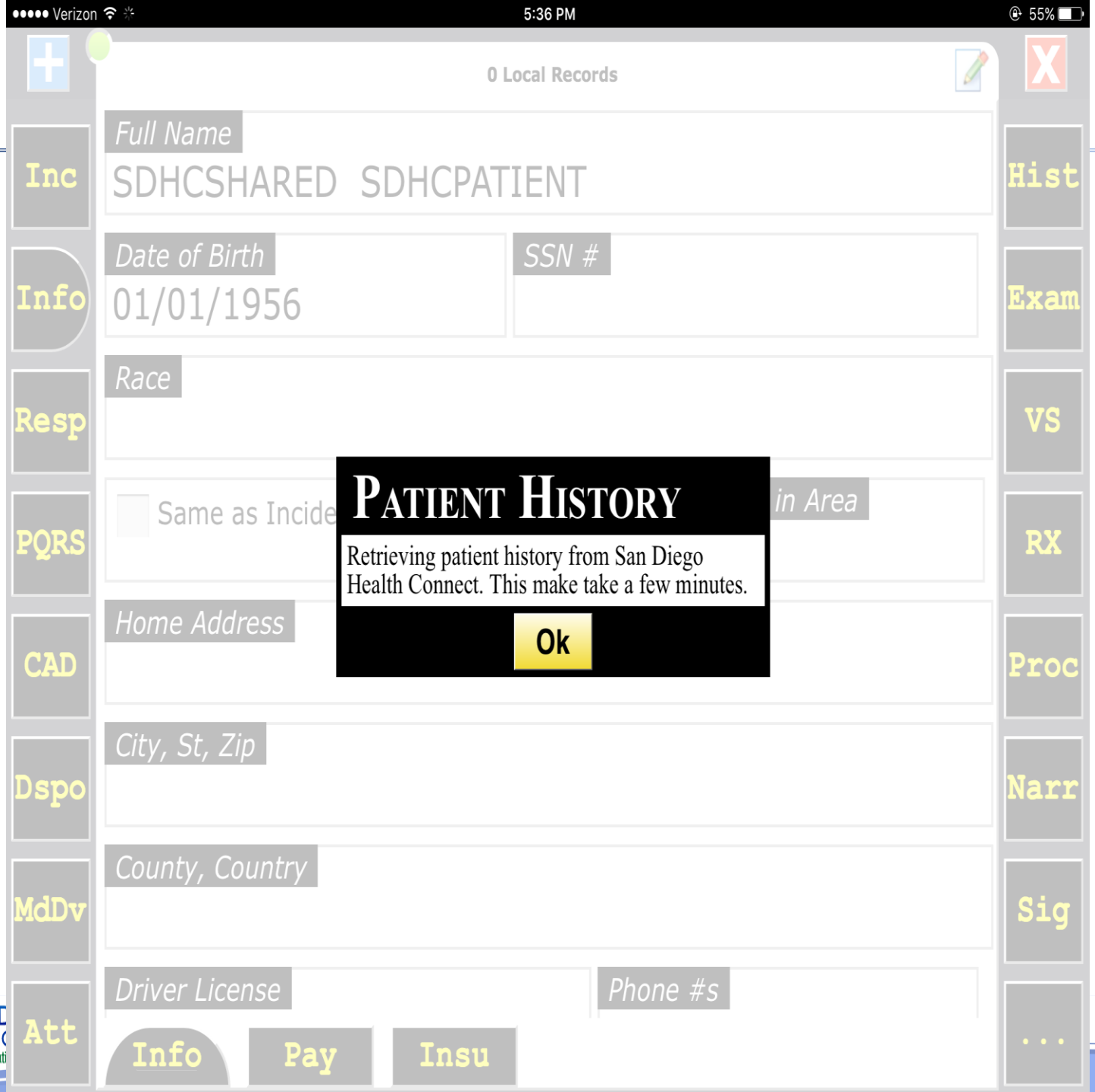
1. Search for the patient in the HIE

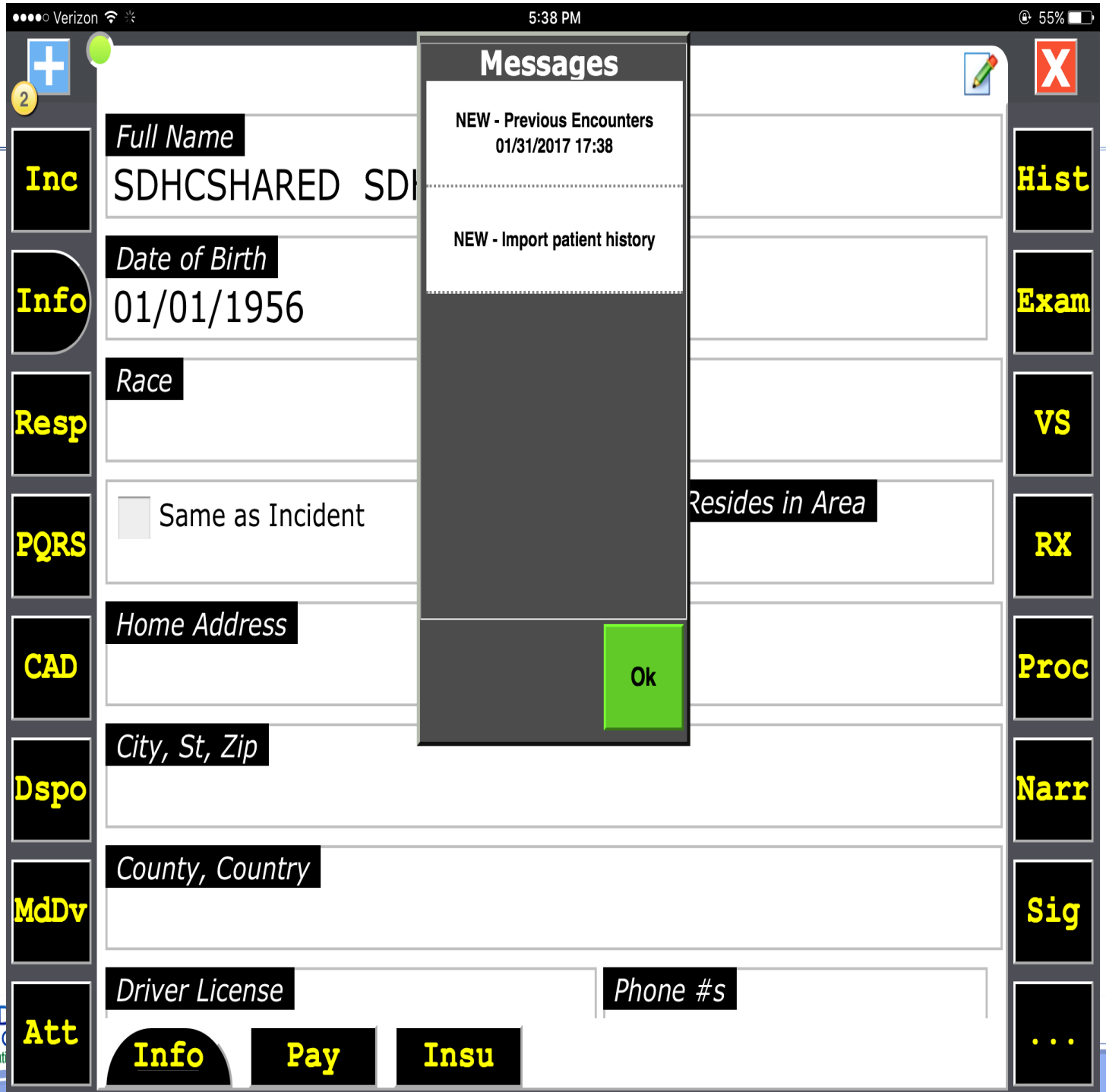
2. Query the HIE for
   - Problems
   - Meds
   - Allergies
   - *Encounters*
   - *POLST*

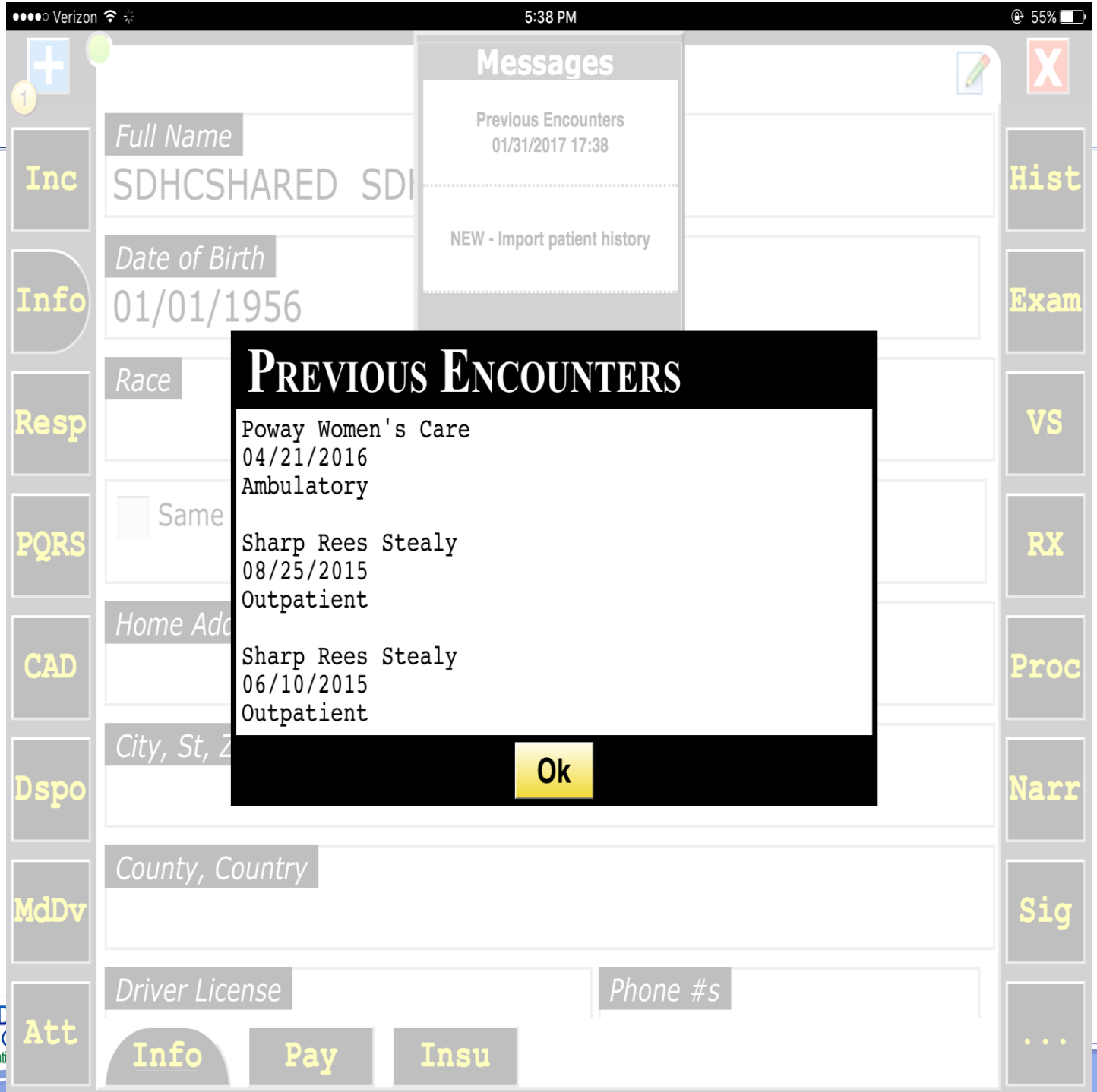

Verizon
5:36 PM
55%
0 Local Records
Full Name
SDHCSHARED SDHCPATIENT
Date of Birth
01/01/1956
SSN #
Race
Same as Incident
Homeless
Resides in Area
Home Address
City, St, Zip
County, Country
Driver License
Phone #s
Inc
Info
Resp
PQRS
CAD
Dspo
MdDv
Att
Hist
Exam
VS
RX
Proc
Narr
Sig
...
Info
Pay
Insu

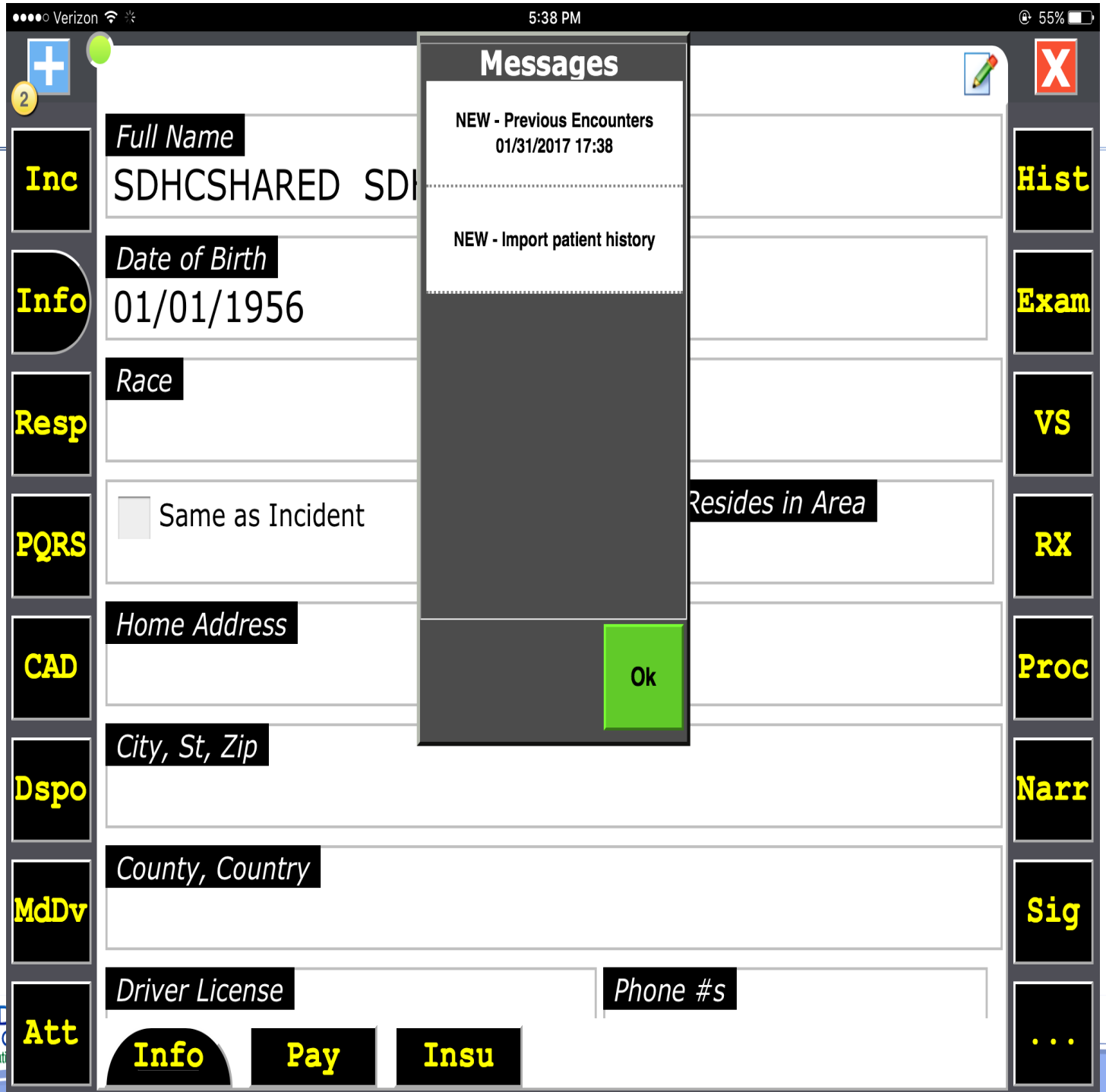

Verizon
5:36 PM
55%
Messages
NEW - Select patient match
Ok
Full Name
SDHCSHARED SDI
Date of Birth
01/01/1956
Race
Same as Incident
Resides in Area
Home Address
City, St, Zip
County, Country
Driver License
Phone #s
Inc
Info
Resp
PQRS
CAD
Dspo
MdDv
Att
Hist
Exam
VS
RX
Proc
Narr
Sig
...
Info
Pay
Insu


Verizon
5:36 PM
55%
Possible patient matches from SD Health Connect
SDHCSHARED SDHCPATIENT
Male
01/01/1956
838 SEVA DRIVE
SAN DIEGO, CA 92103
No match
Ok
Full Name
SDHCSHARED SDI
Date of Birth
01/01/1956
Race
Same as Incident
Resides in Area
Home Address
City, St, Zip
County, Country
Driver License
Phone #s
Inc
Info
Resp
PQRS
CAD
Dspo
MdDv
Att
Hist
Exam
VS
RX
Proc
Narr
Sig
...
Info
Pay
Insu


Verizon
5:36 PM
55%
0 Local Records
Full Name
SDHCSHARED SDHCPATIENT
Date of Birth
01/01/1956
SSN #
Race
Same as Incide
in Area
Home Address
City, St, Zip
County, Country
Driver License
Phone #s
Inc
Info
Resp
PQRS
CAD
Dspo
MdDv
Att
Hist
Exam
VS
RX
Proc
Narr
Sig
...
Info
Pay
Insu
PATIENT HISTORY
Retrieving patient history from San Diego Health Connect. This make take a few minutes.
Ok


Verizon
5:38 PM
55%
Messages
NEW - Previous Encounters
01/31/2017 17:38
NEW - Import patient history
Ok
Full Name
SDHCSHARED SDH
Date of Birth
01/01/1956
Race
Same as Incident
Resides in Area
Home Address
City, St, Zip
County, Country
Driver License
Phone #s
Inc
Info
Resp
PQRS
CAD
Dspo
MdDv
Att
Hist
Exam
VS
RX
Proc
Narr
Sig
...
Info
Pay
Insu


Verizon
5:38 PM
55%
Messages
Previous Encounters
01/31/2017 17:38
NEW - Import patient history
Full Name
SDHCSHARED SDH
Date of Birth
01/01/1956
Race
Same
Home Add
City, St, Z
County, Country
Driver License
Phone #s
Inc
Info
Resp
PQRS
CAD
Dspo
MdDv
Att
Hist
Exam
VS
RX
Proc
Narr
Sig
...
Info
Pay
Insu
PREVIOUS ENCOUNTERS
Poway Women's Care
04/21/2016
Ambulatory
Sharp Rees Stealy
08/25/2015
Outpatient
Sharp Rees Stealy
06/10/2015
Outpatient
Ok


Verizon
5:38 PM
55%
Messages
NEW - Previous Encounters
01/31/2017 17:38
NEW - Import patient history
Ok
Full Name
SDHCSHARED SDH
Date of Birth
01/01/1956
Race
Same as Incident
Resides in Area
Home Address
City, St, Zip
County, Country
Driver License
Phone #s
Inc
Info
Resp
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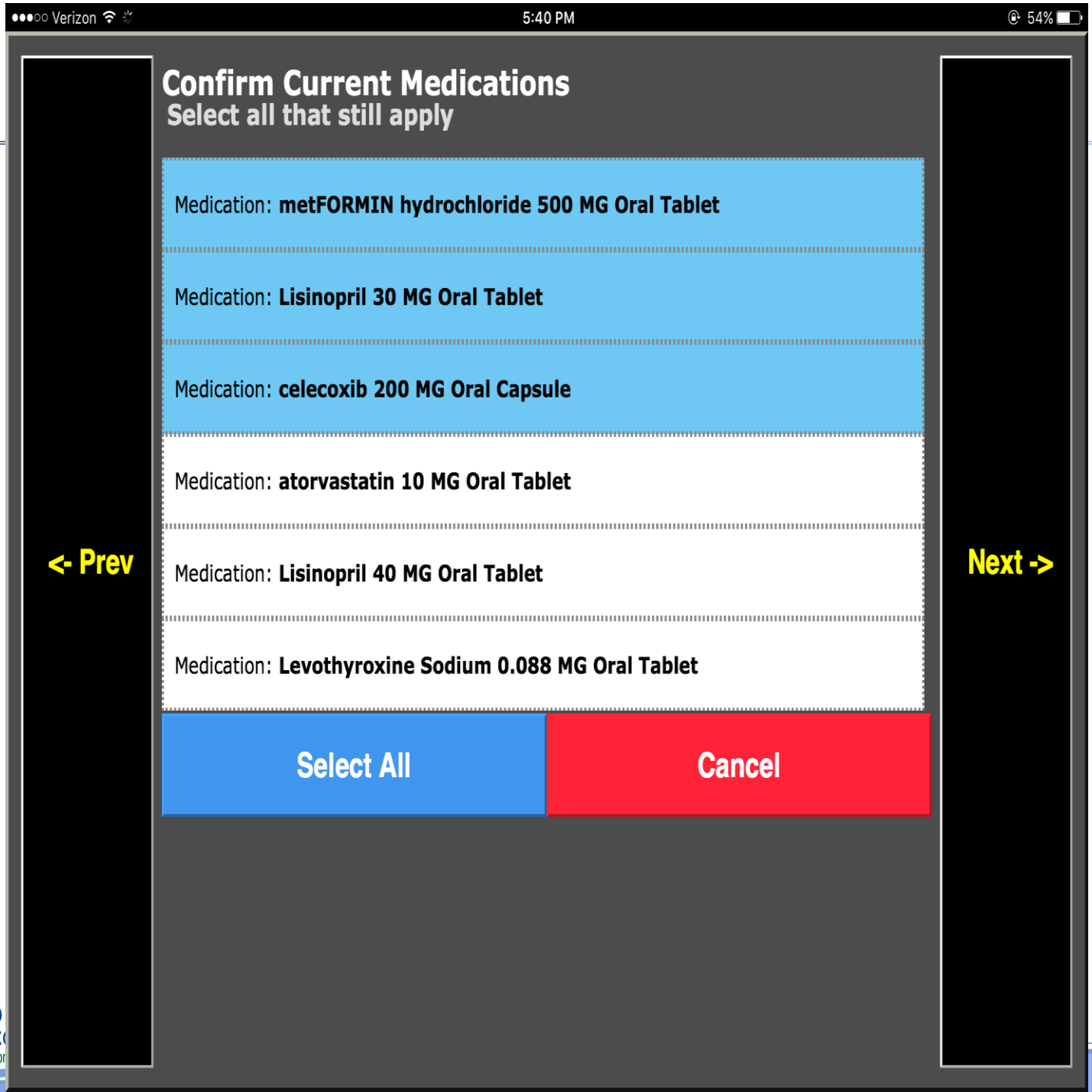
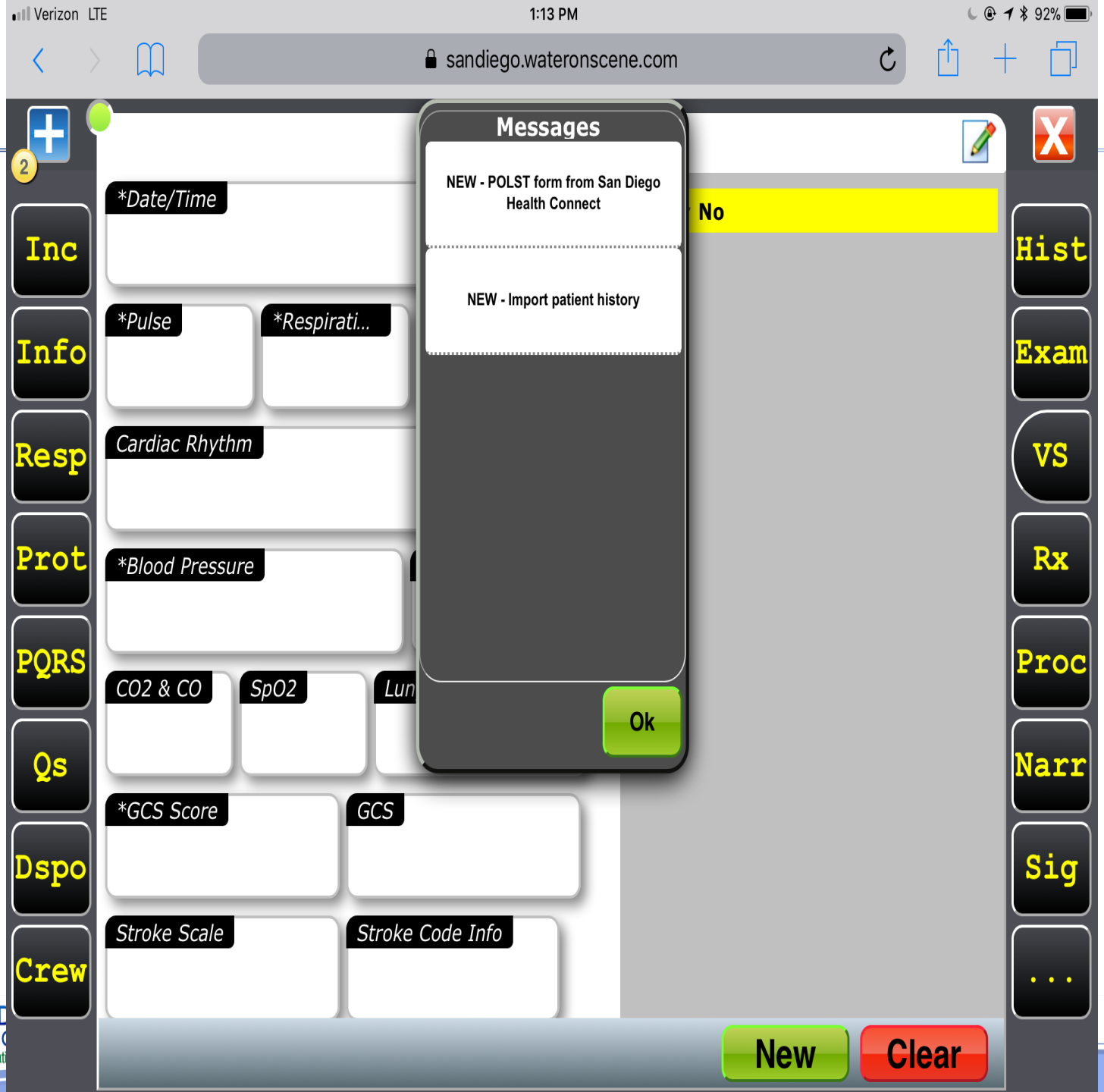
...
Info
Pay
Insu


●●●○○ Verizon
5:40 PM
54%
Confirm Current Medications
Select all that still apply
<- Prev
Next ->
Medication: metFORMIN hydrochloride 500 MG Oral Tablet
Medication: Lisinopril 30 MG Oral Tablet
Medication: celecoxib 200 MG Oral Capsule
Medication: atorvastatin 10 MG Oral Tablet
Medication: Lisinopril 40 MG Oral Tablet
Medication: Levothyroxine Sodium 0.088 MG Oral Tablet
Select All
Cancel

POLST Pilot


Verizon LTE
1:13 PM
92%
sandiego.wateronscene.com
Messages
NEW - POLST form from San Diego Health Connect
NEW - Import patient history
Ok
*Date/Time
No
*Pulse
*Respirati...
Cardiac Rhythm
*Blood Pressure
CO2 & CO
SpO2
*GCS Score
GCS
Stroke Scale
Stroke Code Info
Inc
Info
Resp
Prot
PQRS
Qs
Dspo
Crew
Hist
Exam
VS
Rx
Proc
Narr
Sig
...
New
Clear

HIPAA PERMITS DISCLOSURE OF POLST TO OTHER HEALTH CARE PROVIDERS AS NECESSARY

Physician Orders for Life-Sustaining Treatment (POLST)

EMSA #111 B
(Effective 1/1/2016)*

First follow these orders, then contact Physician/NP/PA. A copy of the signed POLST form is a legally valid physician order. Any section not completed implies full treatment for that section. **POLST complements an Advance Directive and is not intended to replace that document.**

Patient Last Name:	Date Form Prepared:
Patient First Name:	Patient Date of Birth:
Patient Middle Name:	Medical Record #: *(optional)*

A — CARDIOPULMONARY RESUSCITATION (CPR): *If patient has no pulse and is not breathing.*

If patient is NOT in cardiopulmonary arrest, follow orders in Sections B and C.

Check One

☐ **Attempt Resuscitation/CPR** (Selecting CPR in Section A **requires** selecting Full Treatment in Section B)

☐ **Do Not Attempt Resuscitation/DNR** (Allow Natural Death)

B — MEDICAL INTERVENTIONS: *If patient is found with a pulse and/or is breathing.*

Check One

☐ **Full Treatment – primary goal of prolonging life by all medically effective means.**
In addition to treatment described in Selective Treatment and Comfort-Focused Treatment, use intubation, advanced airway interventions, mechanical ventilation, and cardioversion as indicated.

☐ ***Trial Period of Full Treatment.***

☐ **Selective Treatment – goal of treating medical conditions while avoiding burdensome measures.**
In addition to treatment described in Comfort-Focused Treatment, use medical treatment, IV antibiotics, and IV fluids as indicated. Do not intubate. May use non-invasive positive airway pressure. Generally avoid intensive care.

☐ ***Request transfer to hospital only** if comfort needs cannot be met in current location.*

☐ **Comfort-Focused Treatment – primary goal of maximizing comfort.**
Relieve pain and suffering with medication by any route as needed; use oxygen, suctioning, and manual treatment of airway obstruction. Do not use treatments listed in Full and Selective Treatment unless consistent with comfort goal. ***Request transfer to hospital only if comfort needs cannot be met in current location.***

Additional Orders: _____

C — ARTIFICIALLY ADMINISTERED NUTRITION: *Offer food by mouth if feasible and desired.*

Check One

☐ Long-term artificial nutrition, including feeding tubes.
☐ Trial period of artificial nutrition, including feeding tubes.
☐ No artificial means of nutrition, including feeding tubes.

Additional Orders: _____

D — INFORMATION AND SIGNATURES:

Discussed with: ☐ Patient (Patient Has Capacity) ☐ Legally Recognized Decisionmaker

☐ Advance Directive dated _____, available and reviewed →
☐ Advance Directive not available
☐ No Advance Directive

Health Care Agent if named in Advance Directive:
Name: _____
Phone: _____

Signature of Physician / Nurse Practitioner / Physician Assistant (Physician/NP/PA)
My signature below indicates to the best of my knowledge that these orders are consistent with the patient's medical condition and preferences.

Print Physician/NP/PA Name:	Physician/NP/PA Phone #:	Physician/PA License #, NP Cert. #:
Physician/NP/PA Signature: *(required)*		Date:

Signature of Patient or Legally Recognized Decisionmaker
I am aware that this form is voluntary. By signing this form, the legally recognized decisionmaker acknowledges that this request regarding resuscitative measures is consistent with the known desires of, and with the best interest of, the individual who is the subject of the form.

Print Name:		Relationship: *(write self if patient)*
Signature: *(required)*	Date:	**FOR REGISTRY USE ONLY**
Mailing Address (street/city/state/zip):	Phone Number:	

SEND FORM WITH PATIENT WHENEVER TRANSFERRED OR DISCHARGED

*Form versions with effective dates of 1/1/2009, 4/1/2011 or 10/1/2014 are also valid

SAN DIEGO HEALTH CONNECT
Better Information • Better Care®

POLST eRegistry Status

- **17,163** unique patients have POLST forms with **30,372** total forms in the eRegistry
- eRegistry Utilization - View / Retrieve

	SHARP	UCSD	Rady	IHA	City EMS
Jan – Dec 2018	473	115	97	126	1,868
January 2019	2	1	1	0	216
February	11	11	0	2	156
March	134	147	15	146	171
TOTALS	**620**	**274**	**113**	**274**	**2,411**

Benefits of SEARCH

Paramedics

- Search for patients automatically
- Request Problems, Meds, Allergy, Encounters, POLST
- All rigs in the City running WATER's "Street EMS", ie not limited to UCSD and Rady Children's runs
- Reduces data entry – HIE data loaded into ePCR
- Receiving hospital influenced by previous encounters

Patients

- Better chance they will be taken to "their" ED
- Feel like the community is looking out for them

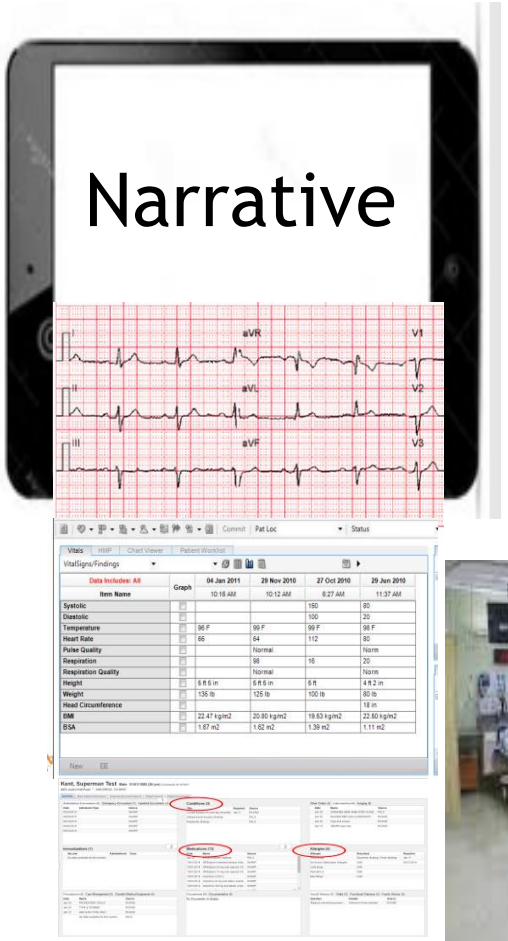
SEARCH Stats – UCSD EDs

~1400 patient searches/day

>60% exact match–don't know what it will be for Rady

~ 450 HIE requests/day (probs, meds, allergies, encounters)

A – ALERT, Data Sent Real-time to ED



Ambulance updates:

1. **Narrative**
2. **EKGs**
3. **Vital signs**

Longitudinal record from HIE

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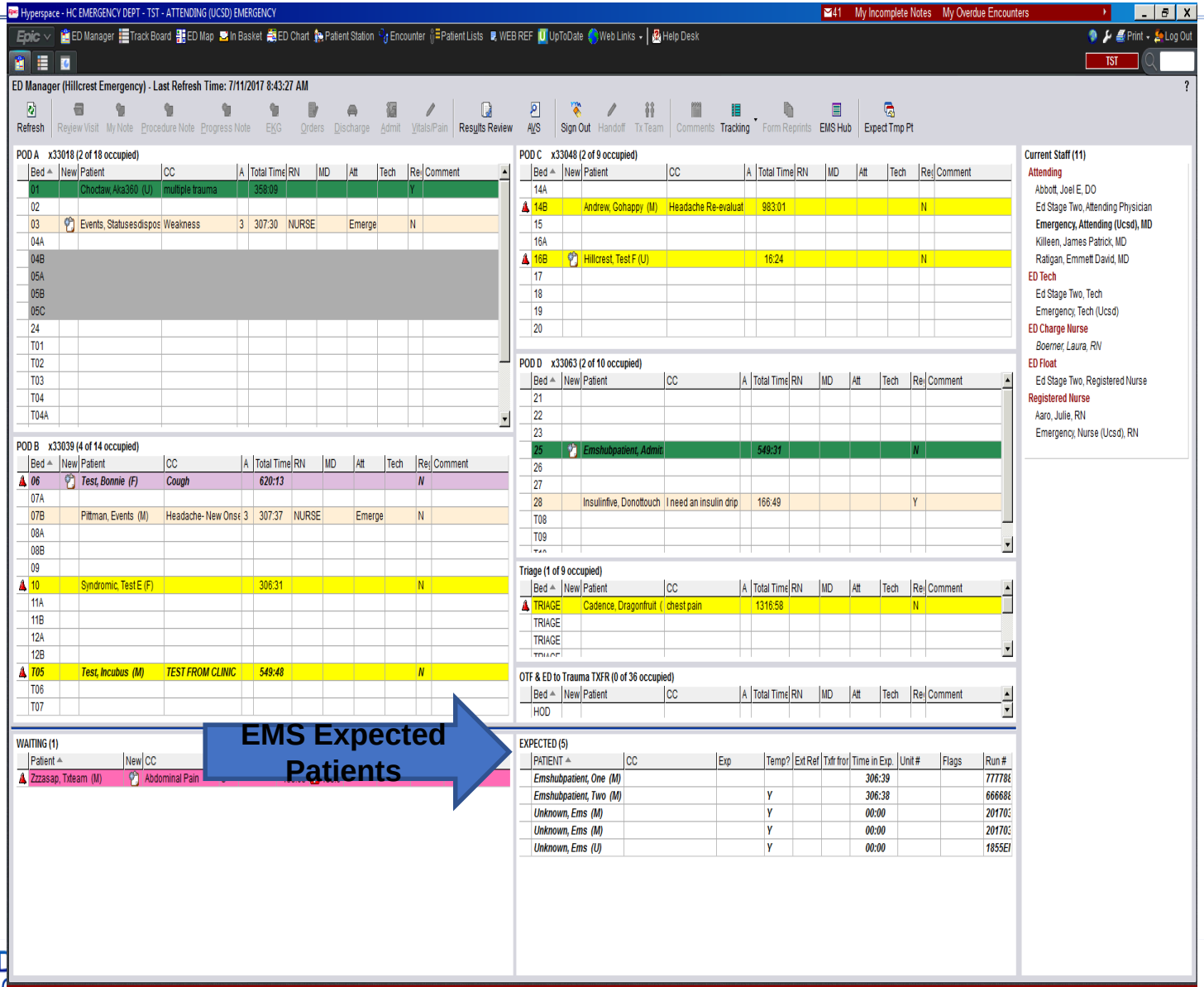
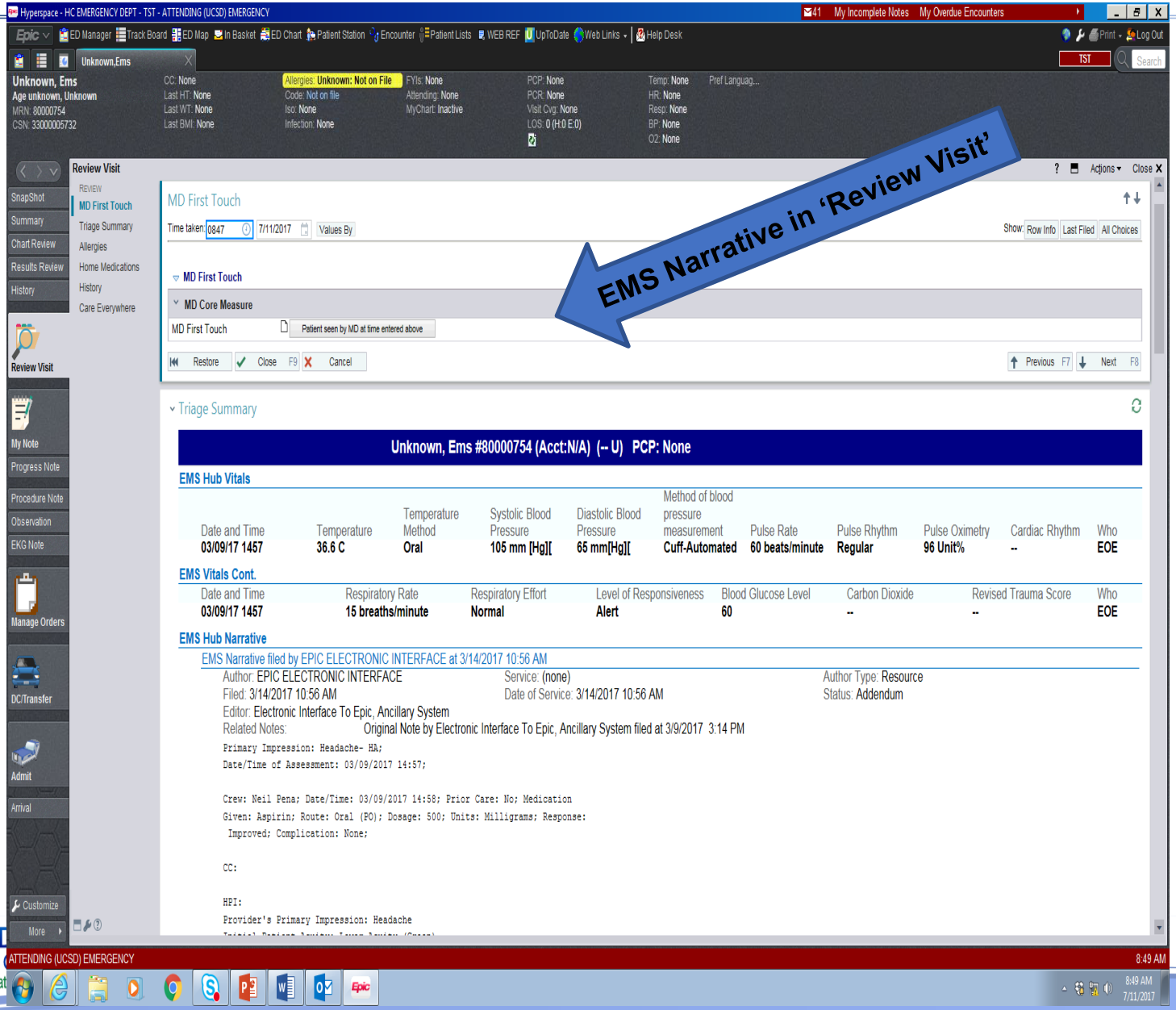
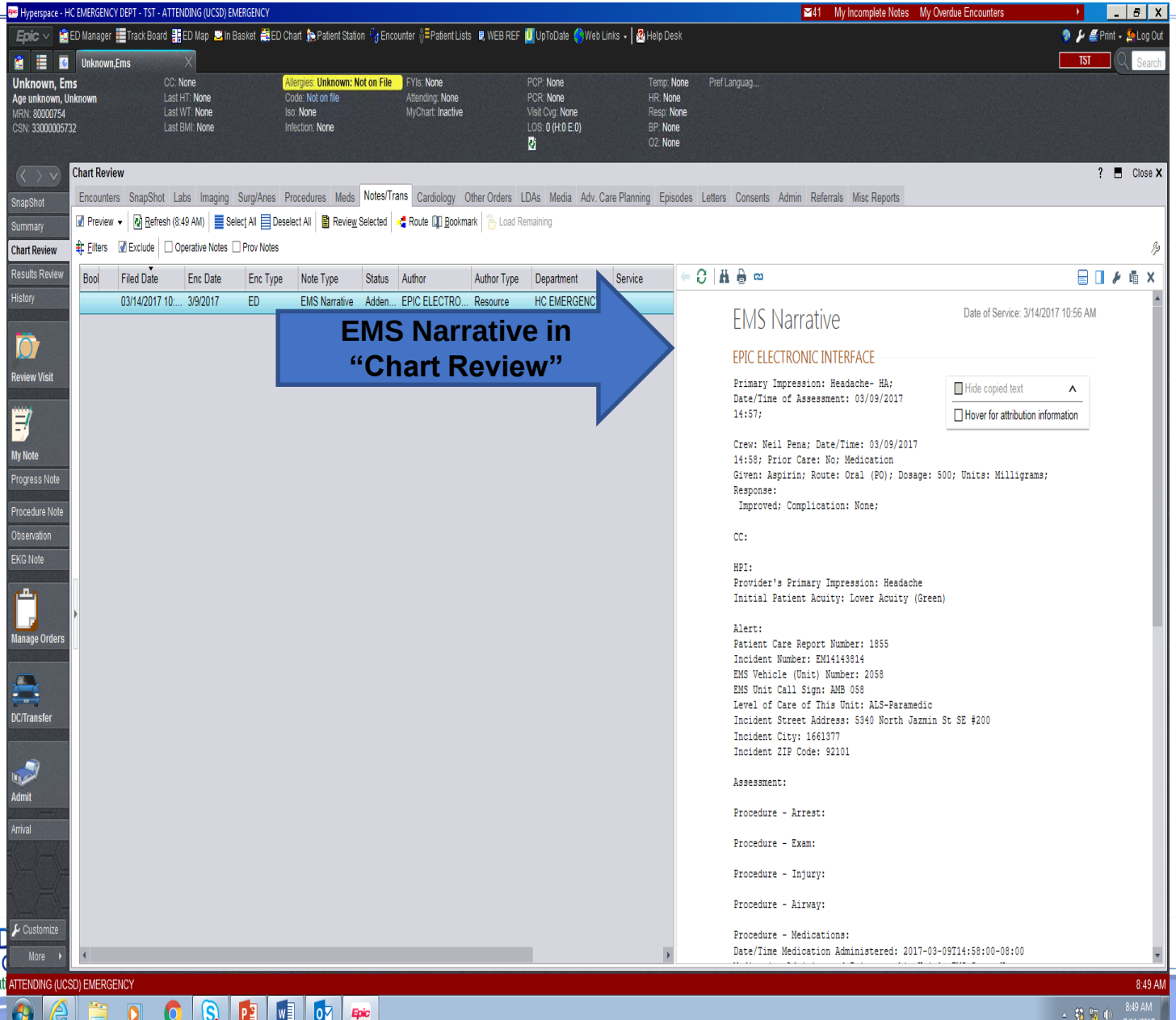
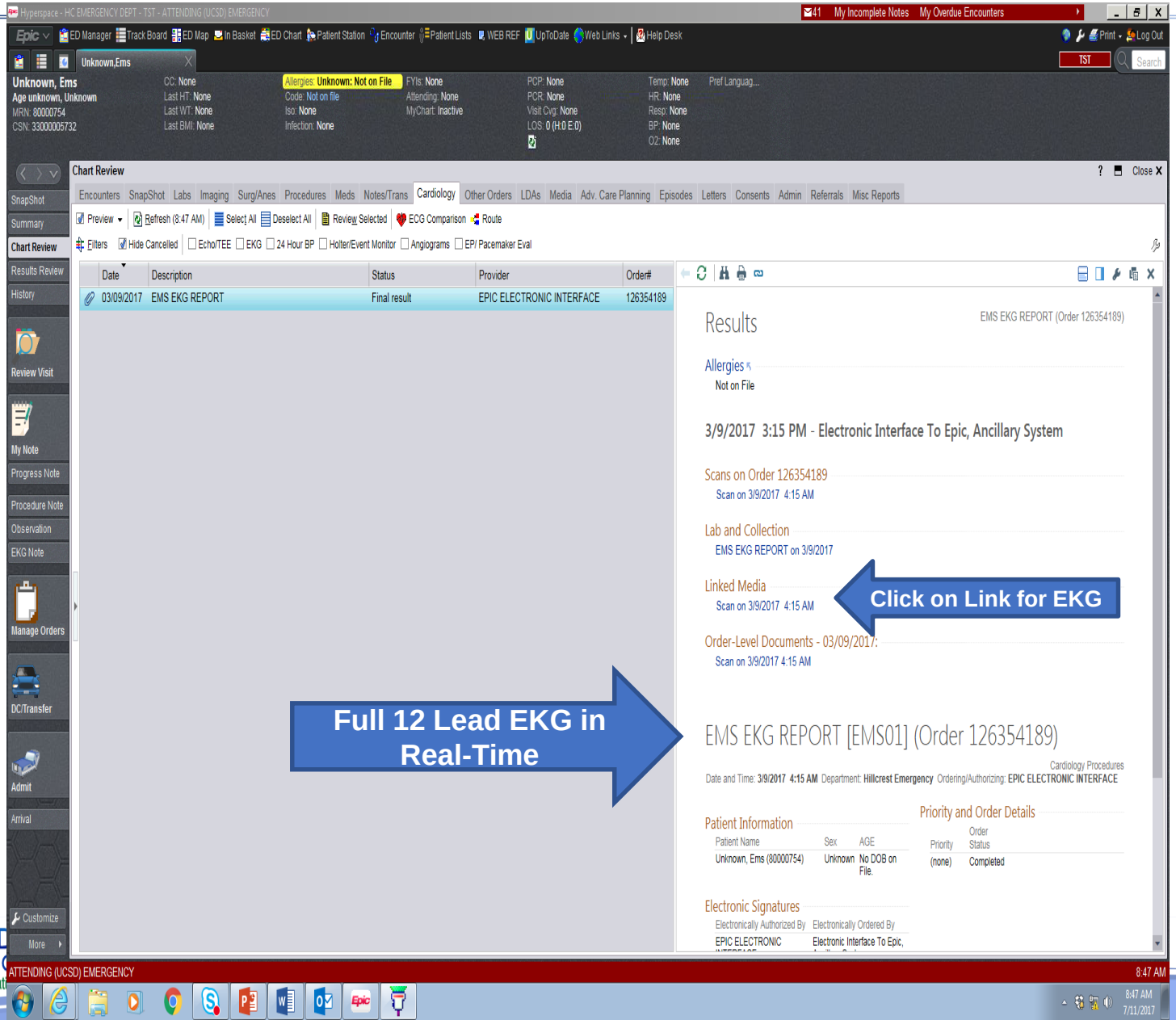
FROM THE ED'S PERSPECTIVE

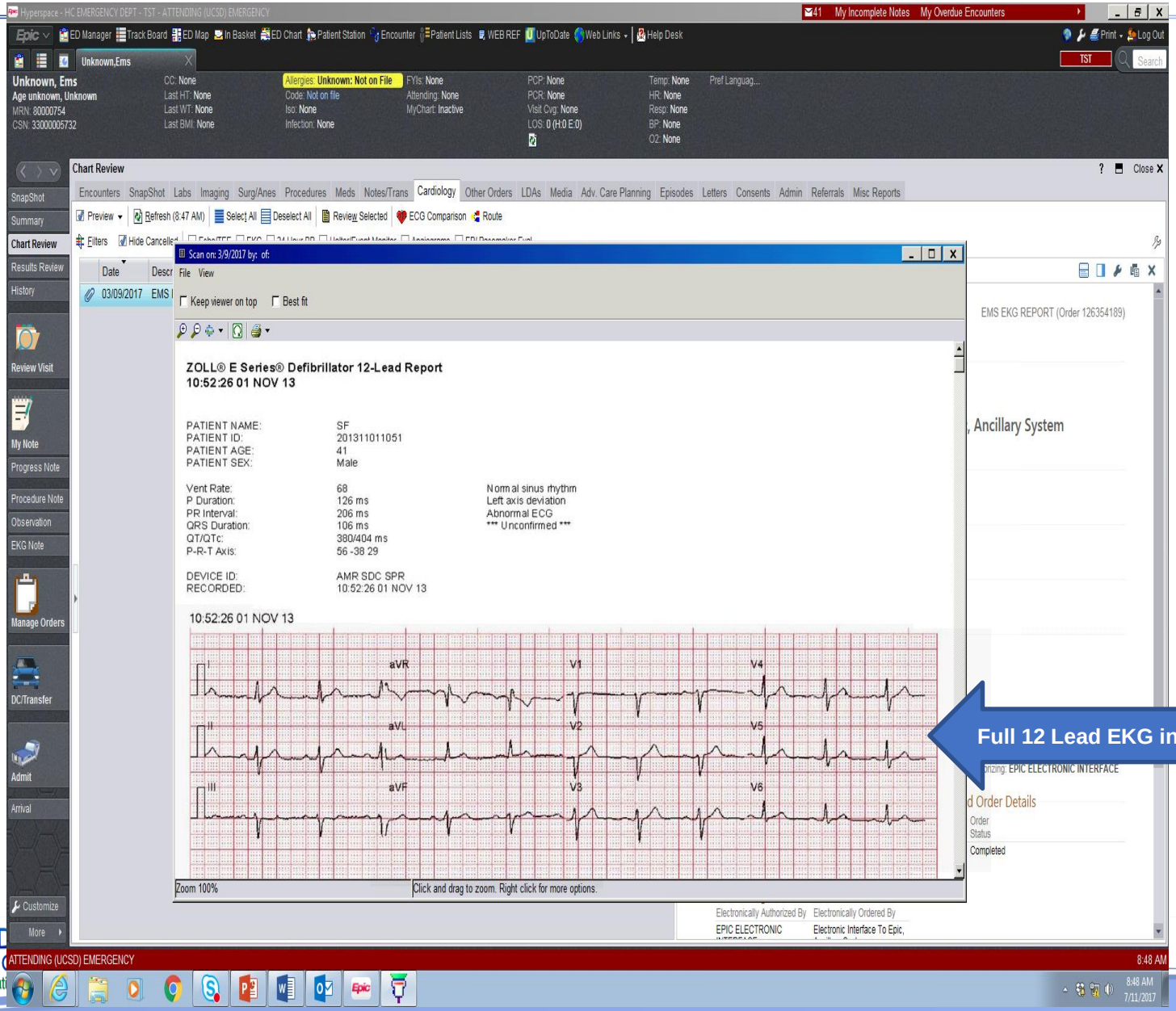
Physicians, nurses, ED Managers…


Hyperspace - HC EMERGENCY DEPT - TST - ATTENDING (UCSD) EMERGENCY
41 My Incomplete Notes My Overdue Encounters
Epic ED Manager Track Board ED Map In Basket ED Chart Patient Station Encounter Patient Lists WEB REF UpToDate Web Links Help Desk
Print Log Out
TST
ED Manager (Hillcrest Emergency) - Last Refresh Time: 7/11/2017 8:43:27 AM
Refresh Review Visit My Note Procedure Note Progress Note EKG Orders Discharge Admit Vitals/Pain Results Review AVS Sign Out Handoff Tx Team Comments Tracking Form Reprints EMS Hub Expect Tmp Pt
POD A x33018 (2 of 18 occupied)
Bed New Patient CC A Total Time RN MD Att Tech Re Comment
01 Choctaw, Aka360 (U) multiple trauma 358:09 Y
02
03 Events, Statusesdispos Weakness 3 307:30 NURSE Emerge N
04A
04B
05A
05B
05C
24
T01
T02
T03
T04
T04A
POD B x33039 (4 of 14 occupied)
Bed New Patient CC A Total Time RN MD Att Tech Re Comment
06 Test, Bonnie (F) Cough 620:13 N
07A
07B Pittman, Events (M) Headache- New Onse 3 307:37 NURSE Emerge N
08A
08B
09
10 Syndromic, Test E (F) 306:31 N
11A
11B
12A
12B
T05 Test, Incubus (M) TEST FROM CLINIC 549:48 N
T06
T07
POD C x33048 (2 of 9 occupied)
Bed New Patient CC A Total Time RN MD Att Tech Re Comment
14A
14B Andrew, Gohappy (M) Headache Re-evaluat 983:01 N
15
16A
16B Hillcrest, Test F (U) 16:24 N
17
18
19
20
POD D x33063 (2 of 10 occupied)
Bed New Patient CC A Total Time RN MD Att Tech Re Comment
21
22
23
25 Emshubpatient, Admit 549:31 N
26
27
28 Insulinfive, Donottouch I need an insulin drip 166:49 Y
T08
T09
Triage (1 of 9 occupied)
Bed New Patient CC A Total Time RN MD Att Tech Re Comment
TRIAGE Cadence, Dragonfruit (chest pain 1316:58 N
TRIAGE
TRIAGE
OTF & ED to Trauma TXFR (0 of 36 occupied)
Bed New Patient CC A Total Time RN MD Att Tech Re Comment
HOD
Current Staff (11)
Attending
Abbott, Joel E, DO
Ed Stage Two, Attending Physician
Emergency, Attending (Ucsd), MD
Killeen, James Patrick, MD
Ratigan, Emmett David, MD
ED Tech
Ed Stage Two, Tech
Emergency, Tech (Ucsd)
ED Charge Nurse
Boerner, Laura, RN
ED Float
Ed Stage Two, Registered Nurse
Registered Nurse
Aaro, Julie, RN
Emergency, Nurse (Ucsd), RN
WAITING (1)
Patient New CC
Zzzasap, Txteam (M) Abdominal Pain
EMS Expected Patients
EXPECTED (5)
PATIENT CC Exp Temp? Ext Ref Txfr fror Time in Exp. Unit # Flags Run #
Emshubpatient, One (M) 306:39 777788
Emshubpatient, Two (M) Y 306:38 666688
Unknown, Ems (M) Y 00:00 201703
Unknown, Ems (M) Y 00:00 201703
Unknown, Ems (U) Y 00:00 1855EI
ATTENDING (UCSD) EMERGENCY
8:43 AM
8:43 AM
7/11/2017


EMS Narrative in 'Review Visit'
Hyperspace - HC EMERGENCY DEPT - TST - ATTENDING (UCSD) EMERGENCY
Unknown, Ems
Age unknown, Unknown
MRN: 80000754
CSN: 33000005732
Review Visit
MD First Touch
Triage Summary
Allergies
Home Medications
History
Care Everywhere
SnapShot
Summary
Chart Review
Results Review
History
Review Visit
My Note
Progress Note
Procedure Note
Observation
EKG Note
Manage Orders
DC/Transfer
Admit
Arrival
Customize
More
Time taken: 0847
7/11/2017
Values By
Show: Row Info
Last Filed
All Choices
MD First Touch
MD Core Measure
Patient seen by MD at time entered above
Restore
Close F9
Cancel
Previous F7
Next F8
Triage Summary
Unknown, Ems #80000754 (Acct:N/A) (-- U) PCP: None
EMS Hub Vitals
Date and Time 03/09/17 1457
Temperature 36.6 C
Temperature Method Oral
Systolic Blood Pressure 105 mm [Hg][
Diastolic Blood Pressure 65 mm[Hg][
Method of blood pressure measurement Cuff-Automated
Pulse Rate 60 beats/minute
Pulse Rhythm Regular
Pulse Oximetry 96 Unit%
Cardiac Rhythm --
Who EOE
EMS Vitals Cont.
Date and Time 03/09/17 1457
Respiratory Rate 15 breaths/minute
Respiratory Effort Normal
Level of Responsiveness Alert
Blood Glucose Level 60
Carbon Dioxide --
Revised Trauma Score --
Who EOE
EMS Hub Narrative
EMS Narrative filed by EPIC ELECTRONIC INTERFACE at 3/14/2017 10:56 AM
Author: EPIC ELECTRONIC INTERFACE
Service: (none)
Author Type: Resource
Filed: 3/14/2017 10:56 AM
Date of Service: 3/14/2017 10:56 AM
Status: Addendum
Editor: Electronic Interface To Epic, Ancillary System
Related Notes: Original Note by Electronic Interface To Epic, Ancillary System filed at 3/9/2017 3:14 PM
Primary Impression: Headache- HA;
Date/Time of Assessment: 03/09/2017 14:57;
Crew: Neil Pena; Date/Time: 03/09/2017 14:58; Prior Care: No; Medication
Given: Aspirin; Route: Oral (PO); Dosage: 500; Units: Milligrams; Response:
Improved; Complication: None;
CC:
HPI:
Provider's Primary Impression: Headache
ATTENDING (UCSD) EMERGENCY
8:49 AM
7/11/2017


Hyperspace - HC EMERGENCY DEPT - TST - ATTENDING (UCSD) EMERGENCY
My Incomplete Notes
My Overdue Encounters
ED Manager
Track Board
ED Map
In Basket
ED Chart
Patient Station
Encounter
Patient Lists
WEB REF
UpToDate
Web Links
Help Desk
Print
Log Out
Unknown,Ems
Unknown, Ems
Age unknown, Unknown
MRN: 80000754
CSN: 33000005732
CC: None
Last HT: None
Last WT: None
Last BMI: None
Allergies: Unknown: Not on File
Code: Not on file
Iso: None
Infection: None
FYIs: None
Attending: None
MyChart: Inactive
PCP: None
PCR: None
Visit Cvg: None
LOS: 0 (H:0 E:0)
Temp: None
HR: None
Resp: None
BP: None
O2: None
Chart Review
Close
SnapShot
Summary
Chart Review
Results Review
History
Review Visit
My Note
Progress Note
Procedure Note
Observation
EKG Note
Manage Orders
DC/Transfer
Admit
Arrival
Customize
More
Encounters
SnapShot
Labs
Imaging
Surg/Anes
Procedures
Meds
Notes/Trans
Cardiology
Other Orders
LDAs
Media
Adv. Care Planning
Episodes
Letters
Consents
Admin
Referrals
Misc Reports
Preview
Refresh (8:49 AM)
Select All
Deselect All
Review Selected
Route
Bookmark
Load Remaining
Filters
Exclude
Operative Notes
Prov Notes
Bool
Filed Date
Enc Date
Enc Type
Note Type
Status
Author
Author Type
Department
Service
03/14/2017 10:...
3/9/2017
ED
EMS Narrative
Adden...
EPIC ELECTRO...
Resource
HC EMERGENC
EMS Narrative in "Chart Review"
EMS Narrative
Date of Service: 3/14/2017 10:56 AM
EPIC ELECTRONIC INTERFACE
Primary Impression: Headache- HA;
Date/Time of Assessment: 03/09/2017
14:57;
Hide copied text
Hover for attribution information
Crew: Neil Pena; Date/Time: 03/09/2017
14:58; Prior Care: No; Medication
Given: Aspirin; Route: Oral (PO); Dosage: 500; Units: Milligrams;
Response:
Improved; Complication: None;
CC:
HPI:
Provider's Primary Impression: Headache
Initial Patient Acuity: Lower Acuity (Green)
Alert:
Patient Care Report Number: 1855
Incident Number: EM14143814
EMS Vehicle (Unit) Number: 2058
EMS Unit Call Sign: AMB 058
Level of Care of This Unit: ALS-Paramedic
Incident Street Address: 5340 North Jazmin St SE #200
Incident City: 1661377
Incident ZIP Code: 92101
Assessment:
Procedure - Arrest:
Procedure - Exam:
Procedure - Injury:
Procedure - Airway:
Procedure - Medications:
Date/Time Medication Administered: 2017-03-09T14:58:00-08:00
ATTENDING (UCSD) EMERGENCY
8:49 AM


Hyperspace - HC EMERGENCY DEPT - TST - ATTENDING (UCSD) EMERGENCY
My Incomplete Notes
My Overdue Encounters
ED Manager
Track Board
ED Map
In Basket
ED Chart
Patient Station
Encounter
Patient Lists
WEB REF
UpToDate
Web Links
Help Desk
Print
Log Out
Unknown,Ems
Unknown, Ems
Age unknown, Unknown
MRN: 80000754
CSN: 33000005732
Allergies: Unknown: Not on File
Code: Not on file
Chart Review
Encounters
SnapShot
Labs
Imaging
Surg/Anes
Procedures
Meds
Notes/Trans
Cardiology
Other Orders
LDAs
Media
Adv. Care Planning
Episodes
Letters
Consents
Admin
Referrals
Misc Reports
Preview
Refresh (8:47 AM)
Select All
Deselect All
Review Selected
ECG Comparison
Route
Filters
Hide Cancelled
Echo/TEE
EKG
24 Hour BP
Holter/Event Monitor
Angiograms
EP/ Pacemaker Eval
Date
Description
Status
Provider
Order#
03/09/2017
EMS EKG REPORT
Final result
EPIC ELECTRONIC INTERFACE
126354189
Results
EMS EKG REPORT (Order 126354189)
Allergies
Not on File
3/9/2017 3:15 PM - Electronic Interface To Epic, Ancillary System
Scans on Order 126354189
Scan on 3/9/2017 4:15 AM
Lab and Collection
EMS EKG REPORT on 3/9/2017
Linked Media
Scan on 3/9/2017 4:15 AM
Order-Level Documents - 03/09/2017:
Scan on 3/9/2017 4:15 AM
Click on Link for EKG
Full 12 Lead EKG in Real-Time
EMS EKG REPORT [EMS01] (Order 126354189)
Cardiology Procedures
Date and Time: 3/9/2017 4:15 AM Department: Hillcrest Emergency Ordering/Authorizing: EPIC ELECTRONIC INTERFACE
Patient Information
Patient Name
Sex
AGE
Unknown, Ems (80000754)
Unknown
No DOB on File.
Priority and Order Details
Priority
Order Status
(none)
Completed
Electronic Signatures
Electronically Authorized By
Electronically Ordered By
EPIC ELECTRONIC
Electronic Interface To Epic,
SnapShot
Summary
Chart Review
Results Review
History
Review Visit
My Note
Progress Note
Procedure Note
Observation
EKG Note
Manage Orders
DC/Transfer
Admit
Arrival
Customize
More
ATTENDING (UCSD) EMERGENCY
8:47 AM
7/11/2017


Hyperspace - HC EMERGENCY DEPT - TST - ATTENDING (UCSD) EMERGENCY
41 My Incomplete Notes My Overdue Encounters
Epic ED Manager Track Board ED Map In Basket ED Chart Patient Station Encounter Patient Lists WEB REF UpToDate Web Links Help Desk
Print Log Out
Unknown,Ems
TST
Search
Unknown, Ems
Age unknown, Unknown
MRN: 80000754
CSN: 33000005732
CC: None
Last HT: None
Last WT: None
Last BMI: None
Allergies: Unknown: Not on File
Code: Not on file
Iso: None
Infection: None
FYIs: None
Attending: None
MyChart: Inactive
PCP: None
PCR: None
Visit Cvg: None
LOS: 0 (H:0 E:0)
Temp: None
HR: None
Resp: None
BP: None
O2: None
Pref Languag...
Chart Review
Close
Encounters SnapShot Labs Imaging Surg/Anes Procedures Meds Notes/Trans Cardiology Other Orders LDAs Media Adv. Care Planning Episodes Letters Consents Admin Referrals Misc Reports
Preview Refresh (8:47 AM) Select All Deselect All Review Selected ECG Comparison Route
Filters Hide Cancelled
SnapShot
Summary
Chart Review
Results Review
History
Review Visit
My Note
Progress Note
Procedure Note
Observation
EKG Note
Manage Orders
DC/Transfer
Admit
Arrival
Customize
More
Date
03/09/2017 EMS
Scan on: 3/9/2017 by: of:
File View
Keep viewer on top
Best fit
ZOLL® E Series® Defibrillator 12-Lead Report
10:52:26 01 NOV 13
PATIENT NAME: SF
PATIENT ID: 201311011051
PATIENT AGE: 41
PATIENT SEX: Male
Vent Rate: 68
P Duration: 126 ms
PR Interval: 206 ms
QRS Duration: 106 ms
QT/QTc: 380/404 ms
P-R-T Axis: 56 -38 29
Normal sinus rhythm
Left axis deviation
Abnormal ECG
*** Unconfirmed ***
DEVICE ID: AMR SDC SPR
RECORDED: 10:52:26 01 NOV 13
10:52:26 01 NOV 13
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
Zoom 100%
Click and drag to zoom. Right click for more options.
EMS EKG REPORT (Order 126354189)
, Ancillary System
Order Details
Order
Status
Completed
Electronically Authorized By
Electronically Ordered By
EPIC ELECTRONIC
Electronic Interface To Epic,
ATTENDING (UCSD) EMERGENCY
8:48 AM
7/11/2017
Full 12 Lead EKG in Real-Time

Making a Difference

16 minutes arrival
to cardiac stenting!

door to needle

Benefits of ALERT

ED

- Real-time information displayed in their EMR
- Better care, cardiac stent example
- Possible reduction in data entry
- Possible cost reductions

Paramedics

- Less verbal communication
- No more photos of EKGs sent to ED

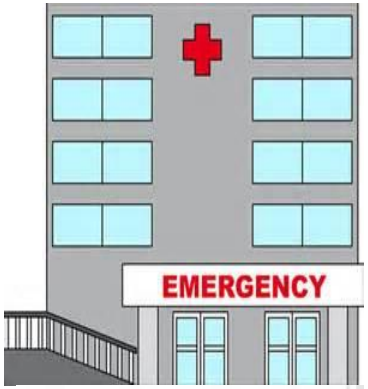
Quote

"the data is here,

where is the

patient?"

F - FILE



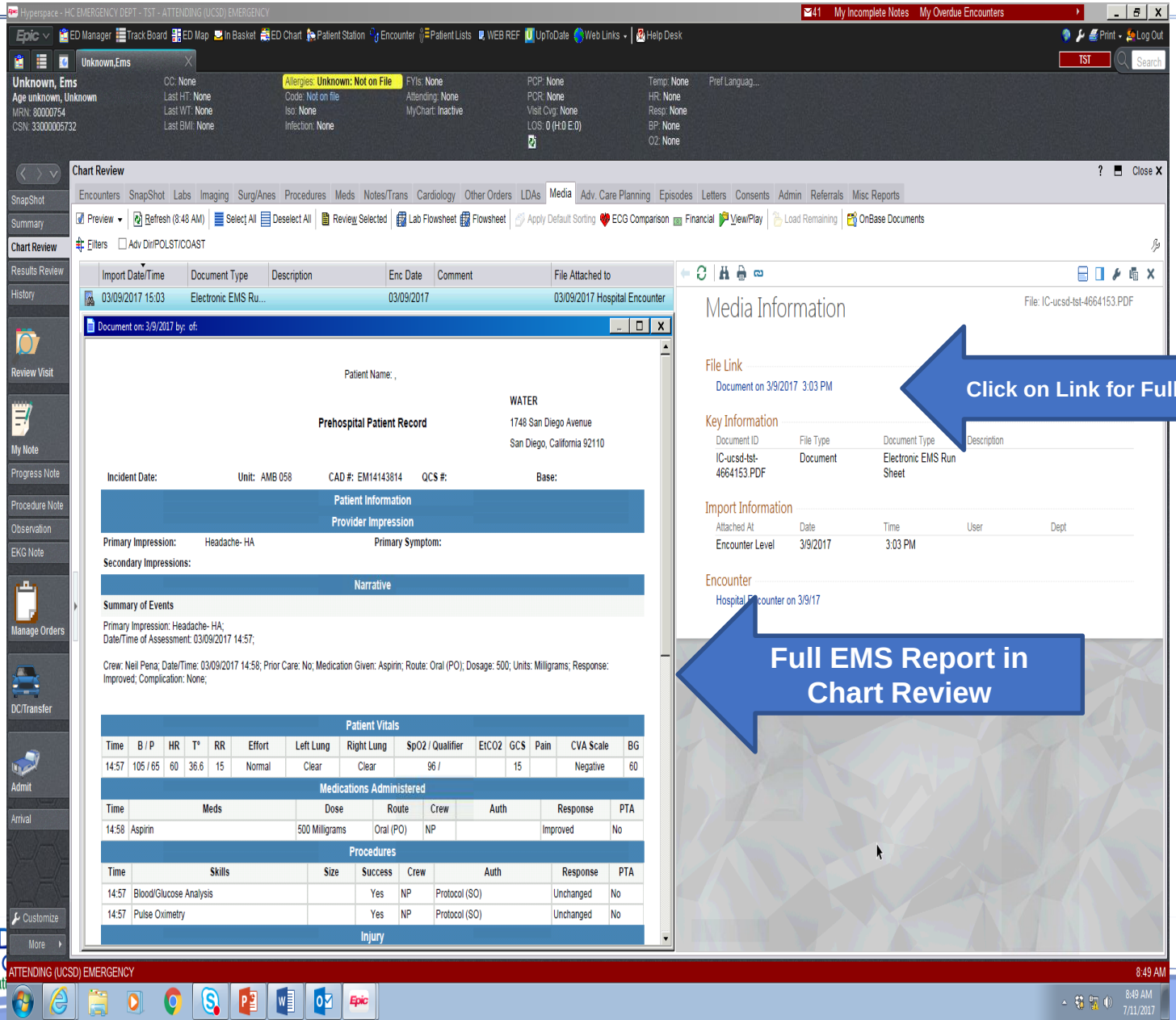
@TOC Record
- Narrative
- Vitals
- More

@TOC Record
- Narrative
- Vitals
- More

i.e. PCR

HIE

SAN DIEGO HEALTH CONNECT
Better Information • Better Care®


Click on Link for Full Report
Full EMS Report in Chart Review

Benefits of File

Paramedics vs TOC verbal communication

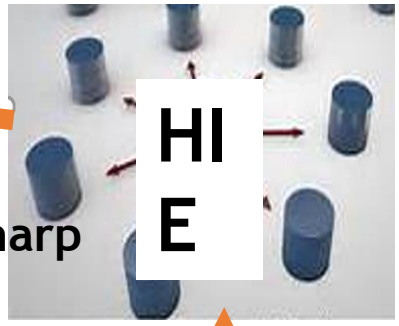
- Reduction in time
- Improvement in accuracy

ED staff

- Ditto
- "PCR" report is in EMR earlier for viewing by all
- Earlier decision making; possible better outcomes

R - RECONCILE

EMS Connector



Kaiser

Sharp

Scripps

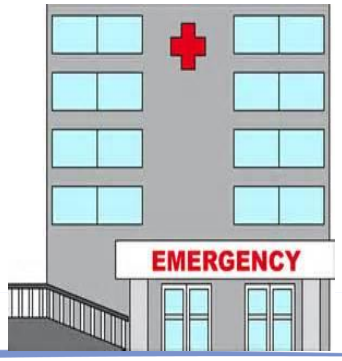
30 more

- Merge msg
- Billing
- eOutcomes

Ambulance/Agency/Other

- Billing
- eOutcomes

for quality analysis



Benefits of RECONCILE and FILE

- **Agency** – clean demographics, billing, eOutcomes
  - Reduces billing times
  - Paramedic satisfaction, e.g. timely ED Disposition

- **UCSD ED Study:** FILE & RECONCILE cost savings
  - not having to prep & scan prehospital EMS reports and revenue reversals due to late/missing EMS documentation of nearly ***$230,000 annually***

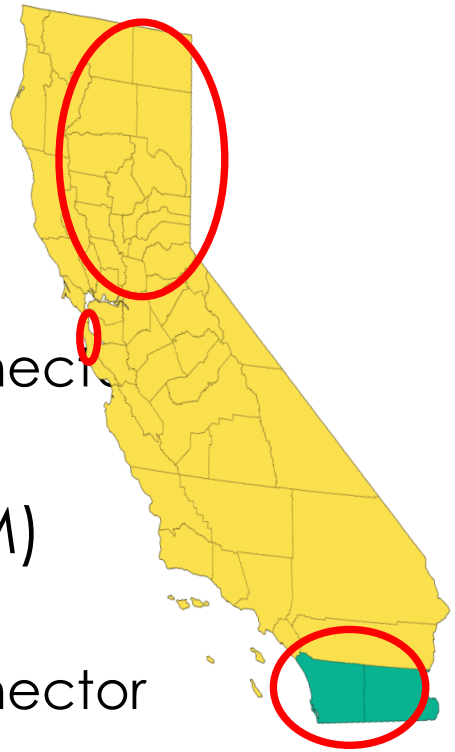
San Diego – Current Metrics

Runs	SEARCH %	ALERT %	FILE %	RECONCILE %
5648	66	92	95	72

MOVING FORWARD

CAEMSA Grants from CMS

- San Diego ($1.6 M)
  - All agencies
  - EDs 15 of 19
- San Mateo ($1.5 M)
  - Will leverage SDHC's EMS Connect
  - SDHC staff assistance
- SacValley Medshare ($3.5 M)
  - 15 Counties in North California
  - Will leverage SDHC's EMS Connector
  - SDHC staff assistance



Trauma Considerations

- Trauma vs non-trauma workflow
  - Differences
    - Known demographics
    - Better patient clinical history
    - Increased patient safety
  - Reporting
- Spend time understanding how trauma workflow might change to better take advantage of SAFR

Summary

- Door to Needle in 16 minutes
- Potential Hard Savings of $115k/year/ED
- Grant $$ - development is re-useable
  - HIE
  - ePCR
  - ED development

Contact

Dan Chavez
Executive Director
San Diego Health Connect
619.573.4445
dchavez@sdhealthconnect.org

April 23 – 24, 2019

10TH ANNUAL TRAUMA SUMMIT

MARINES' MEMORIAL HOTEL
SAN FRANCISCO, CA

CALIFORNIA EMERGENCY
MEDICAL SERVICES AUTHORITY

Sign-in, Evaluations, & Credit Claim

1. Go to eeds.com

2. Sign-in and enter Activity Code

Tuesday, 4/23: 14mity

Wednesday, 4/24: 35show

3. Complete Evaluations and Claim Your Credits *Instantly!*

NEED SOME HELP: See staff at registration desk OR call 559-724-4450

April 23 – 24, 2019

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3. Complete Evaluations and Claim Your Credits *Instantly!*

NEED SOME HELP: See staff at registration desk OR call 559-724-4450

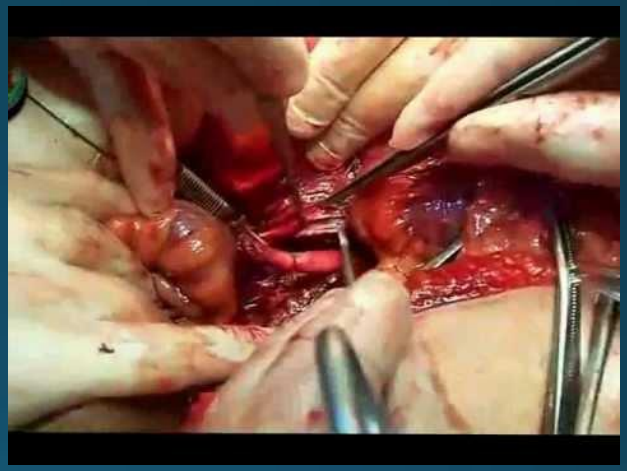
Permissive Hypotension and Damage Control Resuscitation

Gene Hern, MD, MS
EMS Medical Director
Berkeley Fire Department, Oakland Fire Department
AMR Contra Costa County, AMR Critical Care Division
Assoc. Clinical Professor, University of California, San Francisco

Case

- Dispatched to scene of altercation
- 32 year old male involved in argument with another male
- One combatant pulled a knife on the other

- On initial assessment
- BP 90/50, Pulse 120, RR 22, O2 sat 99%
- You start 2 large bore IVs (one is a 16G)
- Hang 1 Liter of fluid for each IV
- Your transport time is 20 min from scene
- BP comes up to 130/90, HR 110



- He makes it to the ICU
- He develops a coagulopathy
- Temp 93 degrees
- Receives a total of 24 units of Packed RBCs

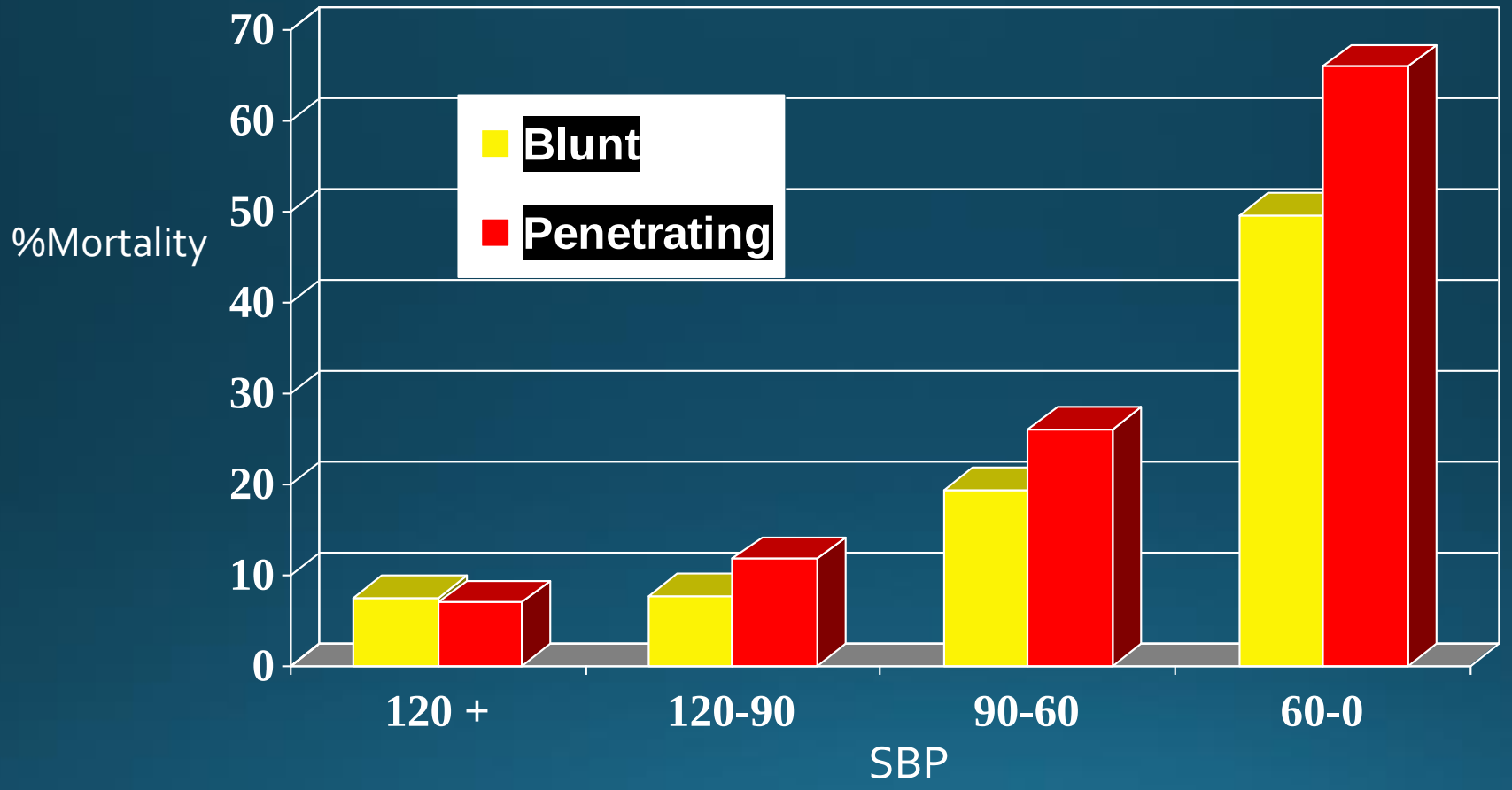
- He makes it to the ICU
- He develops a coagulopathy
- Temp 93 degrees
- Receives a total of 24 units of Packed RBCs

- But ultimately… the patient expires

Brief Review

- Shock - Inability of the body to adequately perfuse end organs which can lead to irreversible damage and death
- Hypovolemic shock from hemorrhage is common with severe injury and must be assumed until ruled out.
- The numbers: 10% of all trauma patients present with immediate post traumatic hypotension.
- Presence of shock in the pre-hospital setting is a STRONG predictor of mortality

Prehospital Hypotension Predicts Mortality



Classes of Hemorrhagic Shock

Class I 750 mL (15%)

- Slightly anxious
- Normal blood pressure
- Heart rate < 100 / min
- Respirations 14-20 / min
- Urinary output 30 mL / hour
- Warm skin, Normal Cap Refill

Class II 750-1500 mL (15-30%)

- Anxious
- Normal blood pressure
- Heart rate > 100 / min
- Decreased pulse pressure
- Respirations 20-30 / min
- Urinary output 20-30 mL / hour
- Pale, Cool, Cap Refill Delayed

Class III 1500-2000 mL (30-40%)

- Confused, anxious
- Decreased blood pressure
- Heart rate > 120 / min
- Decreased pulse pressure
- Respirations 30-40 / min
- Urinary output 5-15 mL / hour
- V. Pale, Sweaty, Cap refill V Delayed

Class IV >2000 mL (>40%)

- Confused, lethargic
- Hypotension
- Heart rate > 140 / min
- Decreased pulse pressure
- Respirations >35 / min
- Urinary output negligible

Not All Trauma Patients are Alike

- Division into 3 categories
  - Blunt
  - Penetrating
  - TBI / Head injury

Not All Trauma Patients are Alike

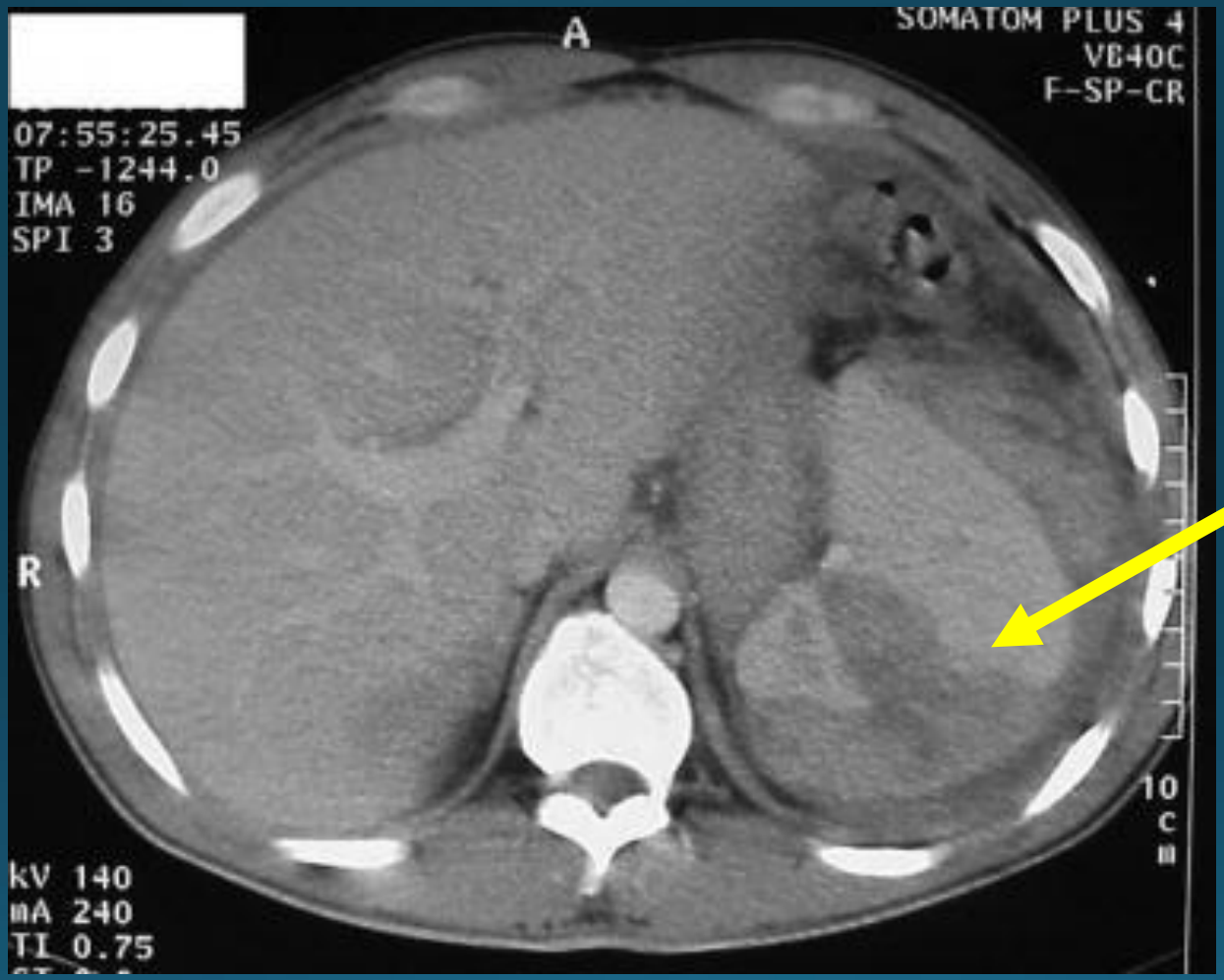
- The very young and very old may present differently.
- Children have a very large reserve capacity
- Elderly may be on medications that blunt normal responses.
  - Unable physically to mount a tachycardic resp
  - Normally hypertensive and may present as "normotensive"

Permissive Hypotension

- "Injection of a fluid that will increase blood pressure has dangers in itself. … If the pressure is raised before the surgeon is ready to check any bleeding that might take place, blood that is sorely needed may be lost."
  — Walter Cannon, 1918

Approach to Permissive Hypotension

- Allow SBP to fall low enough to avoid exsanguination but keep high enough to maintain perfusion
- Goal is to avoid disruption of an unstable clot by higher pressures and worsening of bleeding ("don't pop the clot")


A
SOMATOM PLUS 4
VB40C
F-SP-CR
07:55:25.45
TP -1244.0
IMA 16
SPI 3
R
10
cm
kV 140
mA 240
TI 0.75

- Avoids cyclic over-resuscitation that can lead to rebleeding
- Paradoxically exacerbating hypotension despite increased fluid resuscitation and subsequent complications

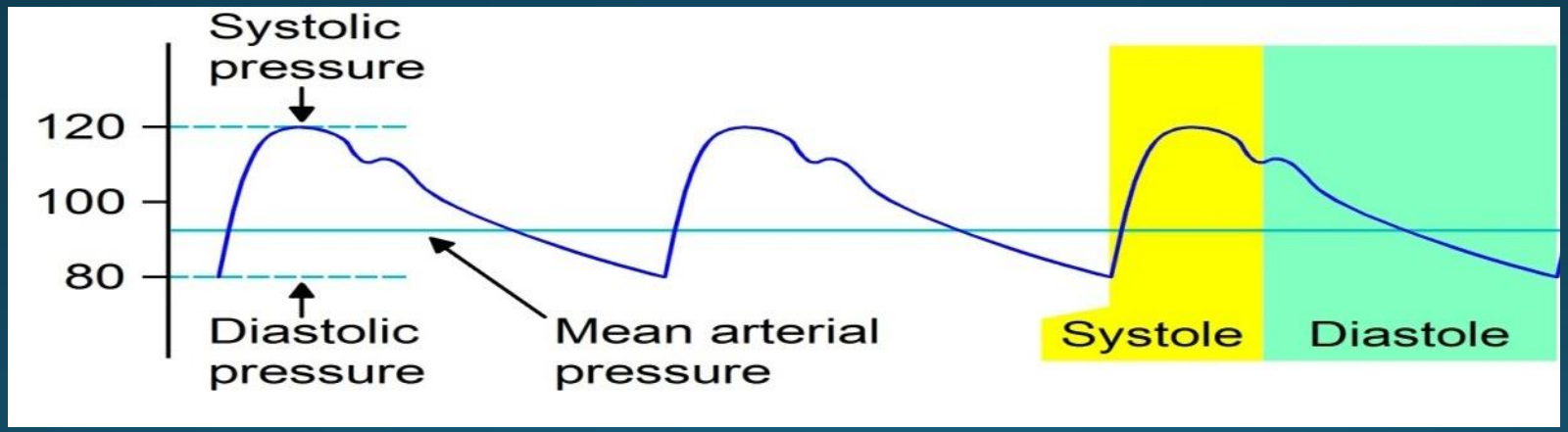
- Low BP is not the target, it is a compromise pending emergency surgical intervention
- Hemorrhage control is the goal, once this achieved (e.g. hemostasis and surgery) normalization of hemodynamics is appropriate

Theoretical Advantages

- NS dilutes clotting factors
- Hypotensive patients vasoconstrict their blood vessels, aggressive resuscitation limits that
- More BP can theoretically dislodge a clot and lead to more bleeding

Mean Arterial Pressure

- (2x Diastolic + Systolic) / 3= MAP



- How low is the right amount??

Data??

The New England
Journal of Medicine

Volume 331 OCTOBER 27, 1994 Number 17

IMMEDIATE VERSUS DELAYED FLUID RESUSCITATION FOR HYPOTENSIVE PATIENTS WITH PENETRATING TORSO INJURIES

WILLIAM H. BICKELL, M.D., MATTHEW J. WALL, JR., M.D., PAUL E. PEPE, M.D., R. RUSSELL MARTIN, M.D., VICTORIA F. GINGER, M.S.N., MARY K. ALLEN, B.A., AND KENNETH L. MATTOX, M.D.

- Non- blinded semi-randomized prospective study
- n = 598 adults with penetrating torso injury and SBP <90mm Hg
- An immediate resuscitation group (even days) and a delayed resuscitation group (odd days) (resuscitation started in OR, not ED)
- Outcome: mortality benefit favoring delayed resuscitation: 70% vs 62% (p= 0.04) even after correcting for the prehospital and emergency room time intervals

Pros/Cons

- Patients were generally generally young fit patients with penetrating trauma
- High-volume trauma center in Houston with very short door-to-OR times
- Good baseline balance: demographics, mortality before reaching OR, time to OR

- Good separation: 1608 and 283 mL fluid given in ER in the two groups
- High potential for bias: not blinded, not randomized
- Lacks external validity to settings where delayed presentations or blunt trauma predominates, or to traumatic brain injury

The Journal of TRAUMA® *Injury, Infection, and Critical Care*

Hypotensive Resuscitation during Active Hemorrhage: Impact on In-Hospital Mortality

Richard P. Dutton, MD, MBA, Colin F. Mackenzie, MD, and Thomas M. Scalea, MD

- RCT with n=110
- Titrating the initial fluid therapy to SBP 70 mmHg versus 100 mmHg during active hemorrhage
- No difference in mortality

Pros/Cons

- Small study with heterogeneous patients
- BP was similar in both groups regardless of the BP target (e.g. 100 ± 17 mmHg in the 70-mmHg group) suggesting physiological adaptation??

REVIEW ARTICLE

The Journal of TRAUMA® Injury, Infection, and Critical Care

Fluid Resuscitation Strategies: A Systematic Review of Animal Trials

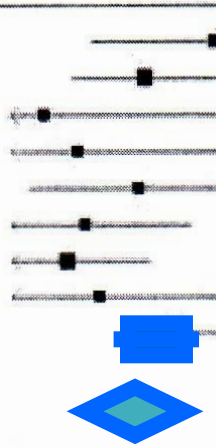
James Mapstone, MB, BChir, Ian Roberts, PhD, FFPHM, and Phillip Evans, MB, BS

- Meta-analysis of animal trials
- Numerous small unblinded studies using animal models suggest permissive hypotension is beneficial in penetrating trauma (e.g. pig aorta injury models)

Review: Animal (for resusc bp targets analysis only)
Comparison: 01 Hypotensive vs. normotensive resuscitation
Outcome: 01 Death

Study	Hypotensive n/N	Normotensive n/N	RR (95%CI Random)	Weight %	RR (95%CI Random)
Burris 1999	3 / 19	6 / 31		6.7	0.82[0.23,2.88]
Capone 1995a	4 / 10	10 / 10		17.2	0.40[0.19,0.85]
Capone 1995b	0 / 10	3 / 10		1.4	0.14[0.01,2.45]
Kowalenko 1992	1 / 8	5 / 8		3.0	0.20[0.03,1.35]
Marshall 1997	3 / 16	8 / 16		8.3	0.38[0.12,1.16]
Stern 1993	3 / 18	7 / 9		8.9	0.21[0.07,0.64]
Stern 1995	5 / 36	14 / 18		14.1	0.18[0.08,0.42]
Stern 2000	1 / 9	4 / 9		2.8	0.25[0.03,1.82]
Talmor 1999	11 / 27	52 / 68		37.6	0.53[0.33,0.86]
Total(95%CI)	31 / 153	109 / 179		100.0	0.37[0.27,0.52]

Test for heterogeneity chi-square=8.58 df=8 p=0.38
Test for overall effect z=-5.75 p<0.00001



Favor hypotensive

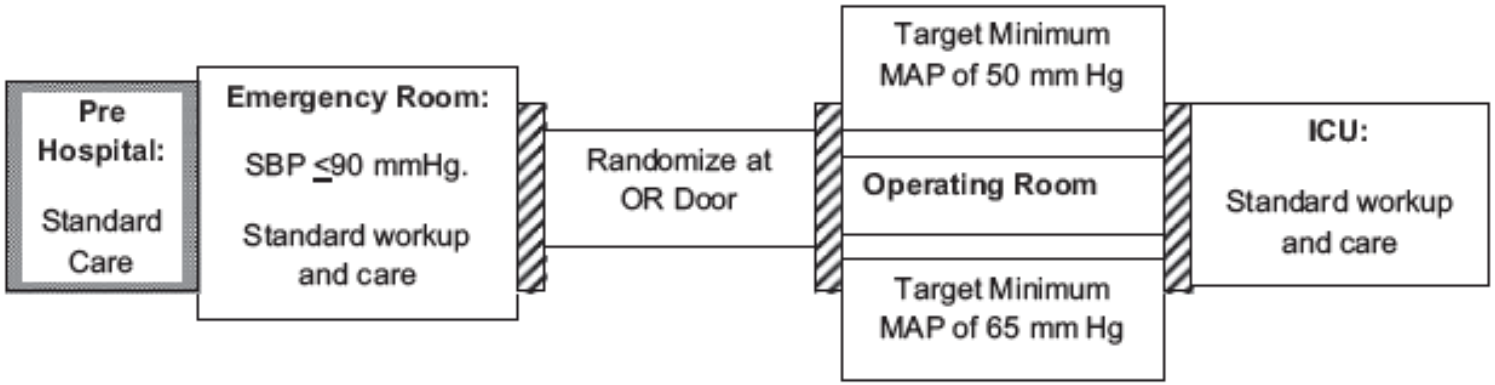
Favor normotensive

How low to go???

ORIGINAL ARTICLE

Hypotensive Resuscitation Strategy Reduces Transfusion Requirements and Severe Postoperative Coagulopathy in Trauma Patients With Hemorrhagic Shock: Preliminary Results of a Randomized Controlled Trial

C. Anne Morrison, MD, MPH, Matthew M. Carrick, MD, Michael A. Norman, MD, Bradford G. Scott, MD, Francis J. Welsh, MD, Peter Tsai, MD, Kathleen R. Liscum, MD, Matthew J. Wall, Jr., MD, and Kenneth L. Mattox, MD


Pre Hospital:
Standard Care
Emergency Room:
SBP ≤90 mmHg.
Standard workup and care
Randomize at OR Door
Target Minimum MAP of 50 mm Hg
Operating Room
Target Minimum MAP of 65 mm Hg
ICU:
Standard workup and care

- 90 patients
- Low MAP (50)
- Standard MAP (65)

Results

- Decreased Coagulopathy
- Lower incidence of transfusions
- Lower transfusions -> Fewer deaths

What about in Non Traumas?

Dünser *et al. Critical Care* 2013, 17:326
http://ccforum.com/content/17/5/326

VIEWPOINT

Re-thinking resuscitation: leaving blood pressure cosmetics behind and moving forward to permissive hypotension and a tissue perfusion-based approach

Martin W Dünser*[1], Jukka Takala[2], Andreas Brunauer[1] and Jan Bakker[3]

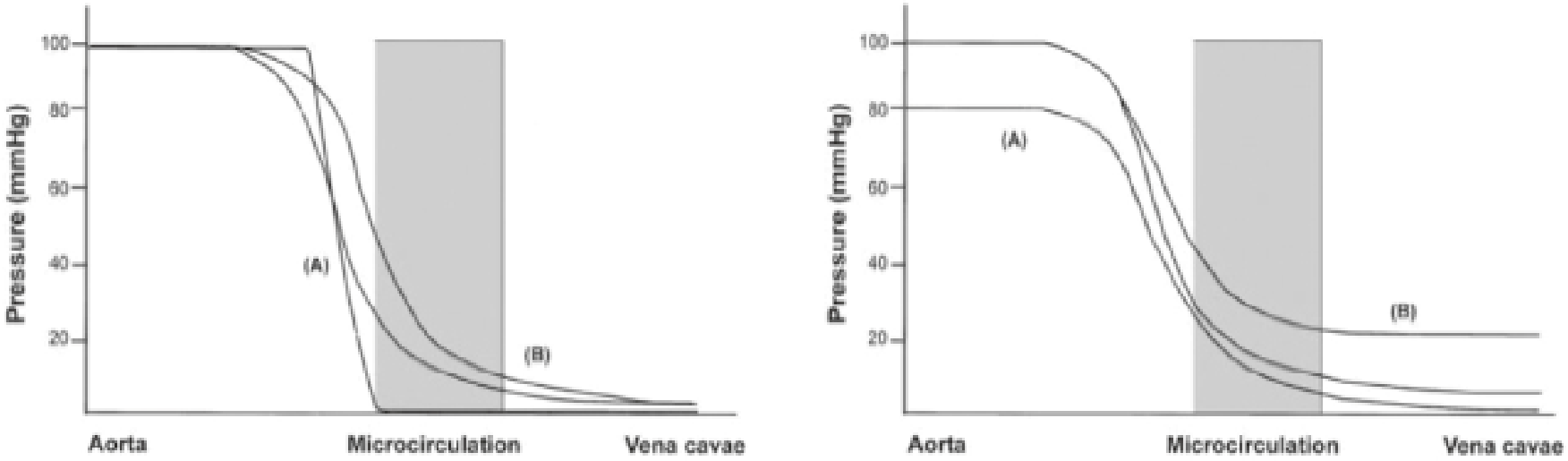


Figure 1. Hydrostatic pressures in circulation. Microcirculation pressure is indicated by shaded area. Values shown to the left and right indicate arterial and venous portions of circulation, respectively. Unlabeled solid curve in both frames represents a normal pressure profile. Left panel: curve A represents maximal arteriolar constriction, and curve B represents arteriolar dilation. Right panel: curves A and B represent decreasing arterial and increasing venous pressures, respectively. Reprinted with permission from the American Physiological Society [21].

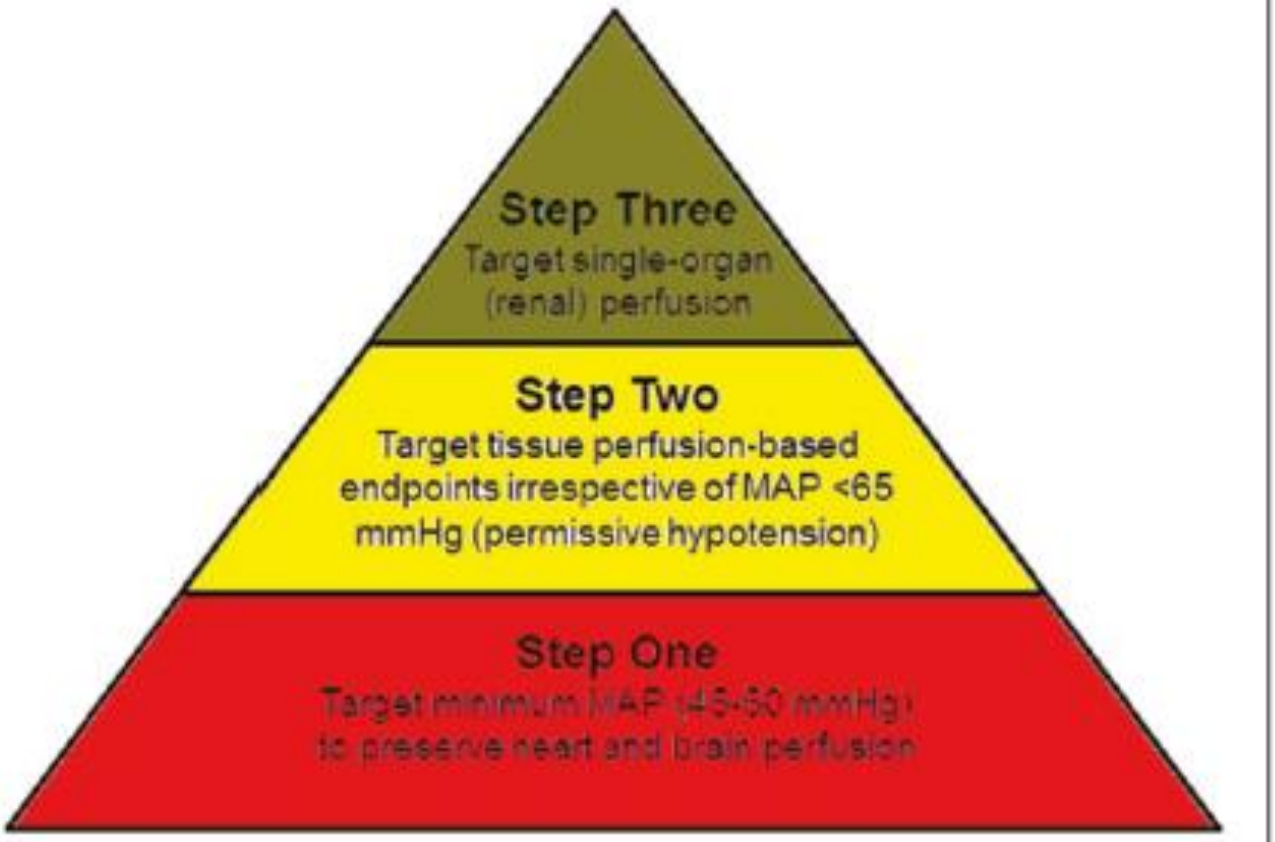
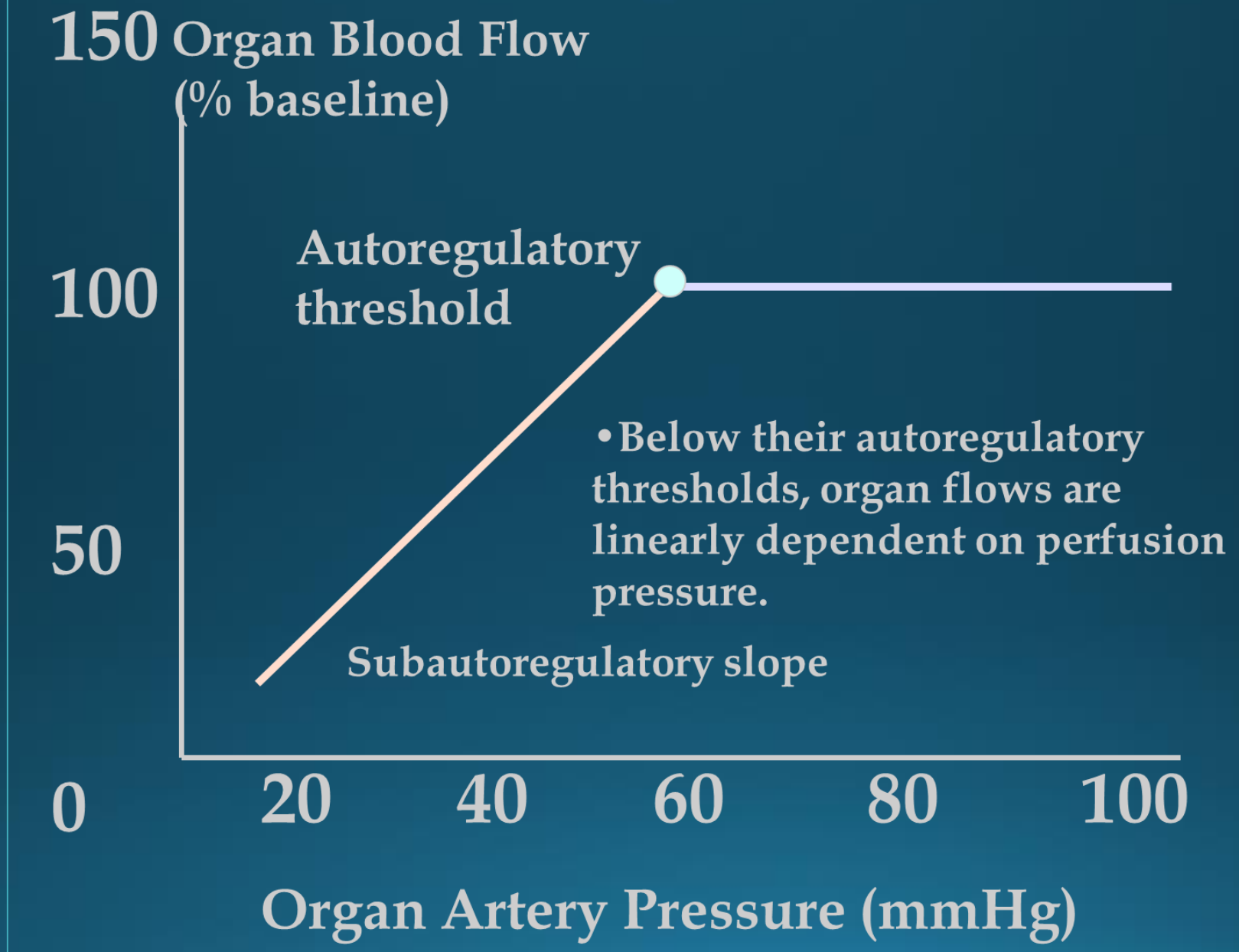


Figure 3. Hierarchy of resuscitation endpoints. MAP, mean arterial blood pressure.


150
Organ Blood Flow
(% baseline)
100
50
0
Autoregulatory
threshold
•Below their autoregulatory thresholds, organ flows are linearly dependent on perfusion pressure.
Subautoregulatory slope
20
40
60
80
100
Organ Artery Pressure (mmHg)

A Detour into Damage Control Surgery…

- Limited surgical interventions to control hemorrhage
- Until the patient has sufficient physiological reserve

Old Paradigm

Damage control resuscitation

- Damage control resuscitation
  - Starts in EMS
  - ED
  - OR
  - ICU
  - OR

- DCR involves hemostatic resuscitation, permissive hypotension (where appropriate) and damage control surgery

Damage control resuscitation

- Hemostatic resuscitation
- Permissive hypotension (where appropriate)
- Damage control surgery

Damage control resuscitation

- Maintain circulating volume
- Control hemorrhage
- Correct the 'lethal triad' of
  - Coagulopathy
  - Acidosis
  - Hypothermia

- Until definitive intervention

Damage control resuscitation

1993, University of Pennsylvania

0022-5282/93/3503-0375$03.00/0
THE JOURNAL OF TRAUMA

Vol. 35, No. 3
Printed in U.S.A.

'DAMAGE CONTROL': AN APPROACH FOR IMPROVED SURVIVAL IN EXSANGUINATING PENETRATING ABDOMINAL INJURY

Michael F. Rotondo, MD, C. William Schwab, MD, FACS, Michael D. McGonigal, MD, FACS, Gordon R. Phillips, III, MD, Todd M. Fruchterman, BA, Donald R. Kauder, MD, FACS, Barbara A. Latenser, MD, and Peter A. Angood, MD

46 Total Patients

22 Subset of major vascular injury

Survival in Immediate Definitive Surgery 11%

Survival in Damage Control group 77%

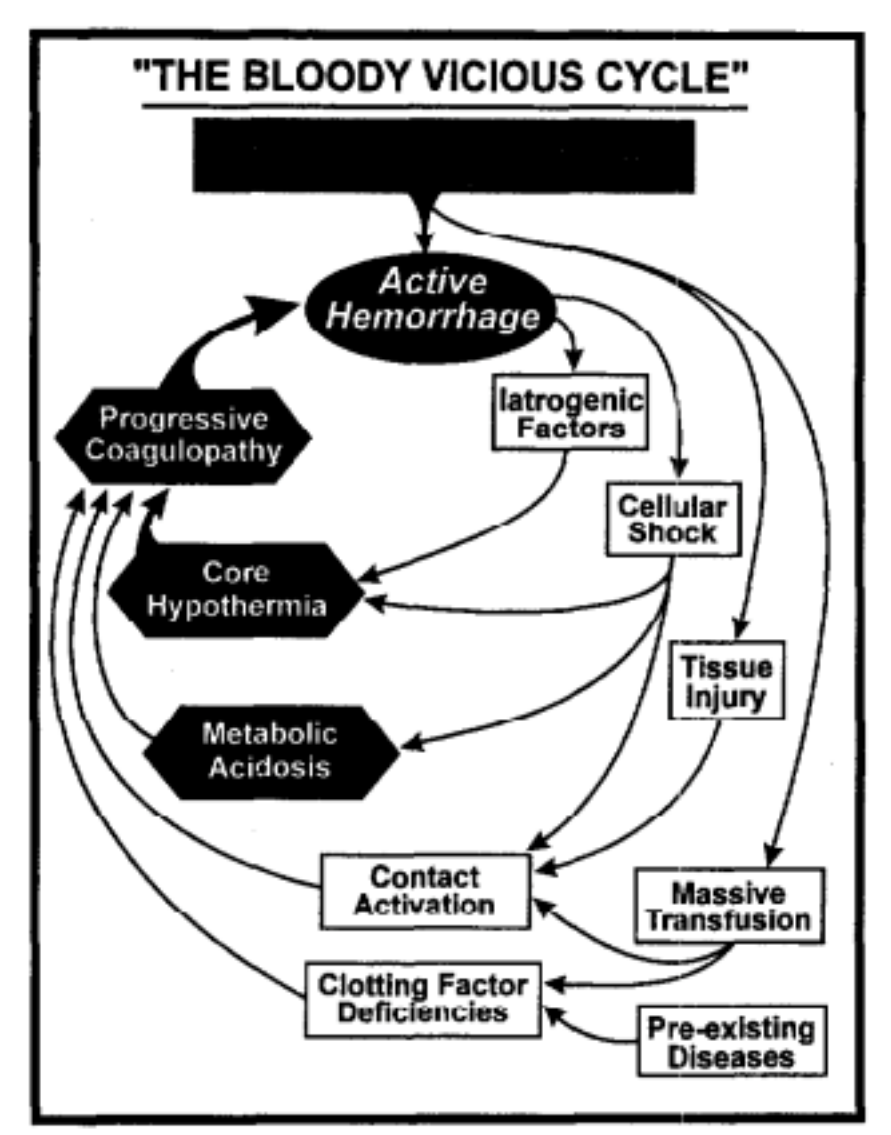
Staged Laparotomy for the Hypothermia, Acidosis, and Coagulopathy Syndrome

Ernest E. Moore, MD, *Denver, Colorado*

Rationale

- Management of the metabolic derangement of ongoing bleeding supersedes the need for definitive surgery

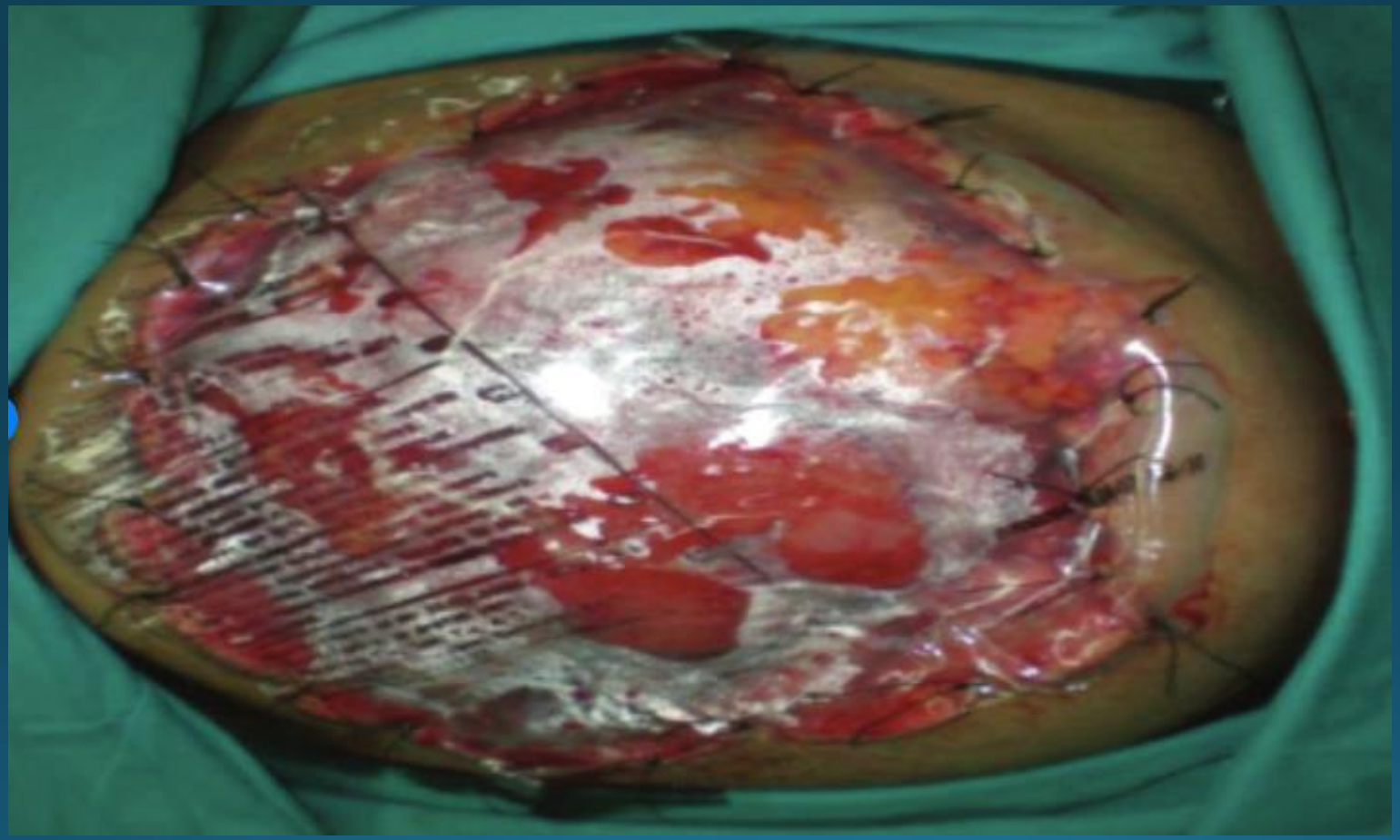
- Abbreviated operations that control hemorrhage and contain spillage from the GI and GU tracts


"THE BLOODY VICIOUS CYCLE"
Active Hemorrhage
Iatrogenic Factors
Progressive Coagulopathy
Cellular Shock
Core Hypothermia
Tissue Injury
Metabolic Acidosis
Contact Activation
Massive Transfusion
Clotting Factor Deficiencies
Pre-existing Diseases

Staged process

- Stop bleeding
- Limit Contamination
- Close Abdomen to prevent heat/protein loss
  - Use of "Bogota Bag" when contents too swollen from inflammation


Sterile Water
for Irrigation,
USP



Next Stage

- Transfer to ICU
  - Hypothermia (ongoing hemostatic resuscitation)
  - Correction of acidosis
  - Coagulopathy

Hypothermia

- Hypothermic on arrival
- Inadequate protection
- IVF administration
- Ongoing blood loss

- ALL worsen it

Hypothermia

- Hemorrhagic shock → inadequate heat production

- Hypothermia → exacerbates coagulopathy
- → interferes with blood homeostatic mechanisms

Acidosis

- Inadequate cellular perfusion
- Anaerobic metabolism
- Production of lactic acid

- -> Profound metabolic acidosis
- Interferes with blood clotting mechanisms
- Promotes coagulopathy
- Blood loss

Coagulopathy

- Hypothermia
- Acidosis
- Massive Blood Transfusions
- → coagulopathy

- Even if bleeding controlled, patients may continue to bleed from all cut surfaces
- Worsening of hemorrhagic shock → worsening of hypothermia and acidosis → prolonging the vicious cycle.

Final Stage

- Definitive operation is deferred
- These operations tend to have a high complication rate
  - Abdominal Compartment Syndrome

Benefits

- Maintenance of normothermia
- Less coagulopathy
- Fewer products used overall, despite increase in pre- and intra-operative blood product use
- May produce decreased Acute Lung Injury, Multi Organ Dysfunction, ARDS and improve survival

Take Home Points in DCS

- Recognition (EMS, Trauma, ICU)
- Hemostatic resuscitation (less NS)
- Rapid → to OR (Scoop and run)
- Initial Surgery (limited, clean, pack)
- ICU (warm, correct coags)
- Re Operation 24-36 hrs (definitive surgery)

Cons on Permissive Hypotension??

- Largely based on animal studies; no high level evidence other than a non-blinded semi-randomized study by Bickell et al, 1994
- Varying interpretations of the meaning and goals of the permissive hypotension approach
- Must not miss non-hemorrhagic causes of hypotension (e.g. tension pneumothorax, pericardial tamponade)

Problems?

- Concerns in the setting of potential traumatic brain injury (TBI), as guidelines support at target CPP of >60 mmHg and retrospective data suggests SBP <90 doubles mortality (see Wiles, 2013)

- Appropriate BP varies with the individual (e.g. patients with chronic hypertension likely need higher blood pressures)

Case

- Dispatch to scene of altercation
- 32 year old male involved in argument with another male
- One combatant pulled a knife on the other

- On initial assessment
- BP 80/50, Pulse 120, RR 22, O2 sat 99%
- You start 2 large bore IVs (one is a 16G)
- BUT he is mentating so you DON'T Hang 1 Liter of fluid for each IV
- Your transport time is 20 min from scene
- BP stays at 80/50, HR 120

- You arrive at hospital and his pressure has remained low but consistent
- BP 80/50, Pulse 110
- Goes to the OR
- Inferior Vena Cava and Hepatic injury
- Patient survives the initial trip as the Trauma team is able to visualize clot around IVC before pressure increased…

- Hepatic Injury Packed
- Vena cava injury addressed
- Bogota Bag Placed

- Goes to ICU with Bear Hugger
- Warmed blood products
- Stabilized

36 hours later…

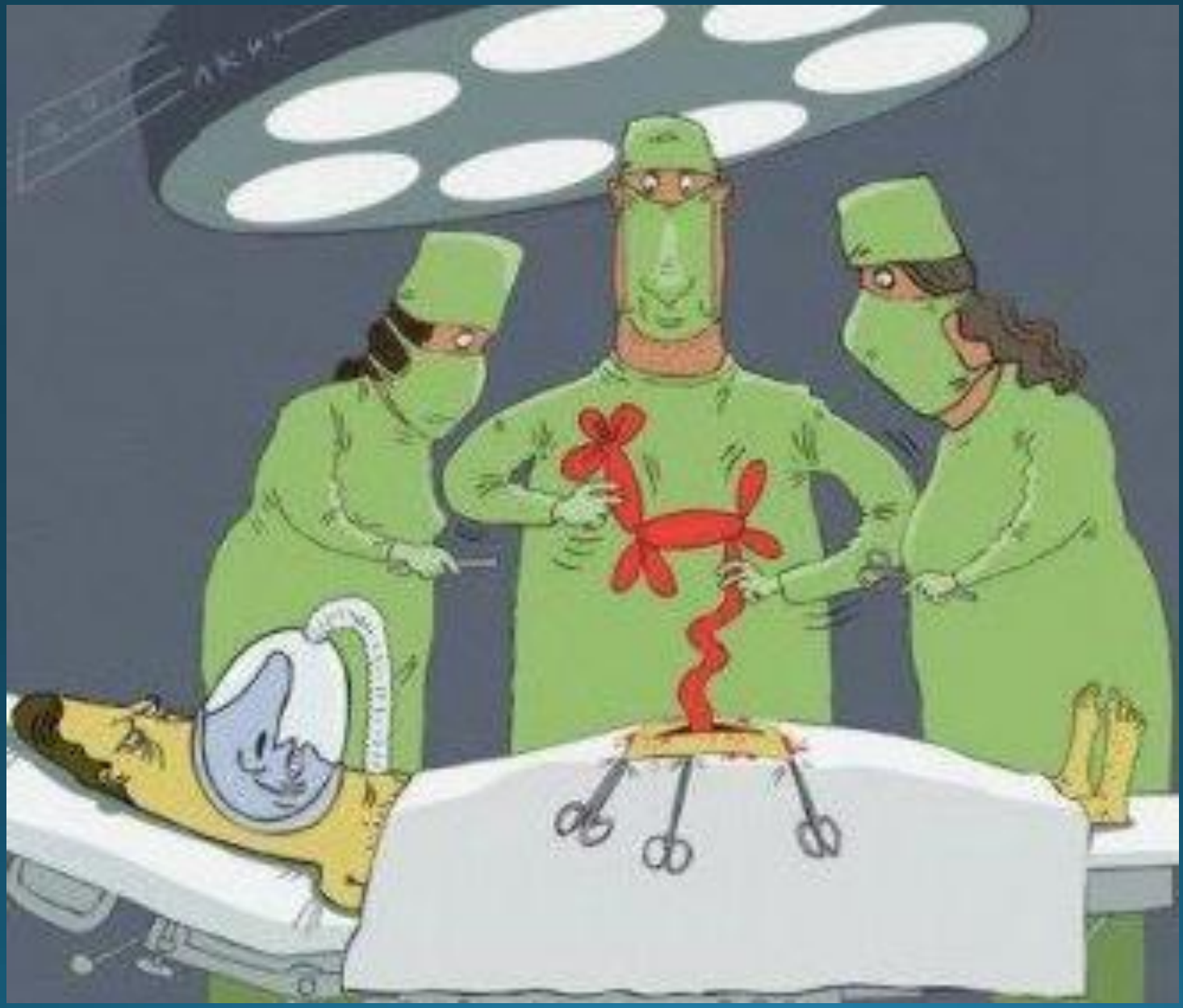
- Swelling of abdominal contents decreases
- Returns to OR for re-exploration
- Packing of Liver Removed
- Mesh Placed for abdominal wall defect

In Summary

- Permissive Hypotension is ONE aspect of Damage Control Trauma Surgery
- Keeping the tissue perfused but not OVER perfused leads to less clotting problems, less transfusions
- Stabilization first → Address coagulopathy, hypothermia, acidosis

- Don't "Pop the Clot"
- Don't "Rush to Close"

- Questions?
- Anecdotes from practice?
- Jokes?



Head Trauma in Older Adults: Burden of Disease and Trauma Triage

Daniel Nishijima, MD, MAS
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UC Davis School of Medicine
10th Annual Trauma Summit
April 24, 2019
San Francisco, CA

Disclosures

- Funding from the CDC and the NIH
- Grant reviewer for Pfizer

Outline

- Burden of disease
- Gaps in knowledge
- Recent research results

Burden of Disease

Older adults have higher morbidity and mortality after head trauma compared to younger adults[1]

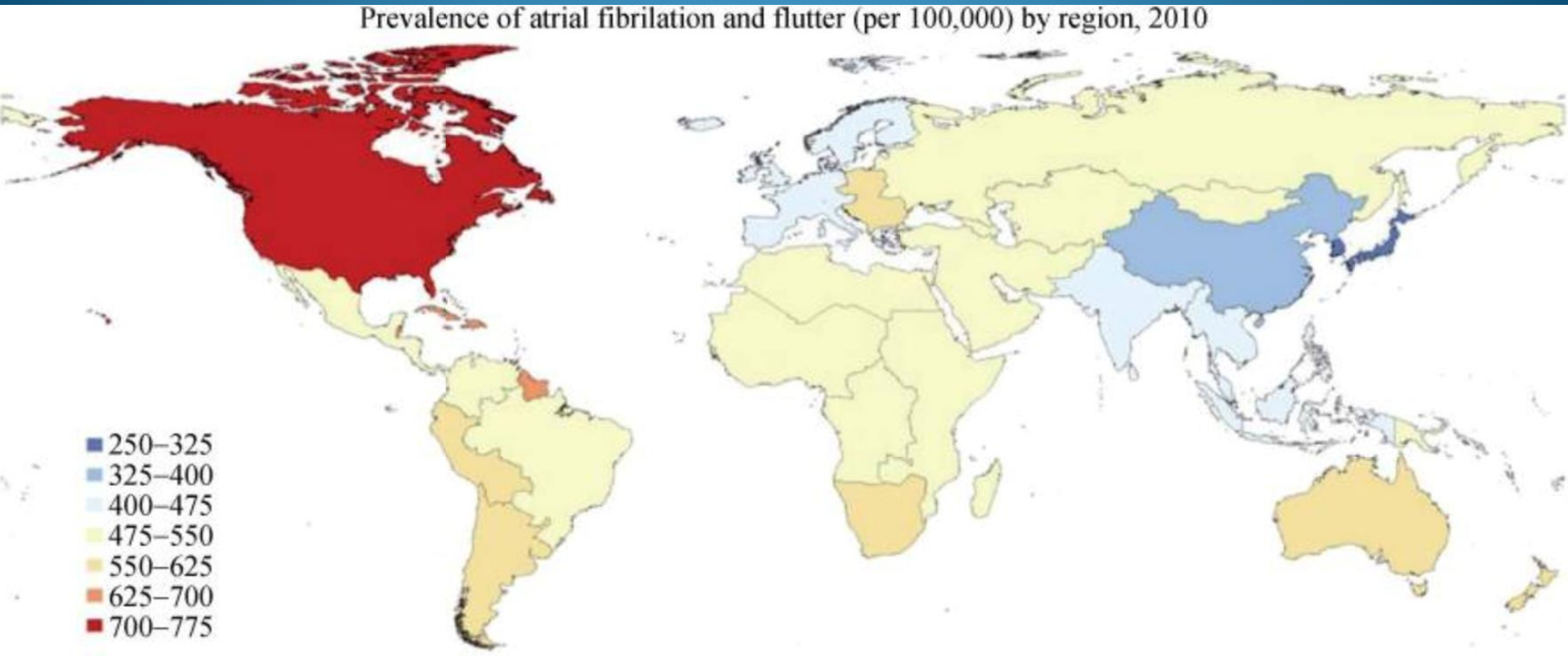
[1] Mushkudiani et al. J Neurotrauma 2007

Atrophy and fragility of bridging veins

More comorbidities

More frequent use of anticoagulants

Burden of atrial fibrillation



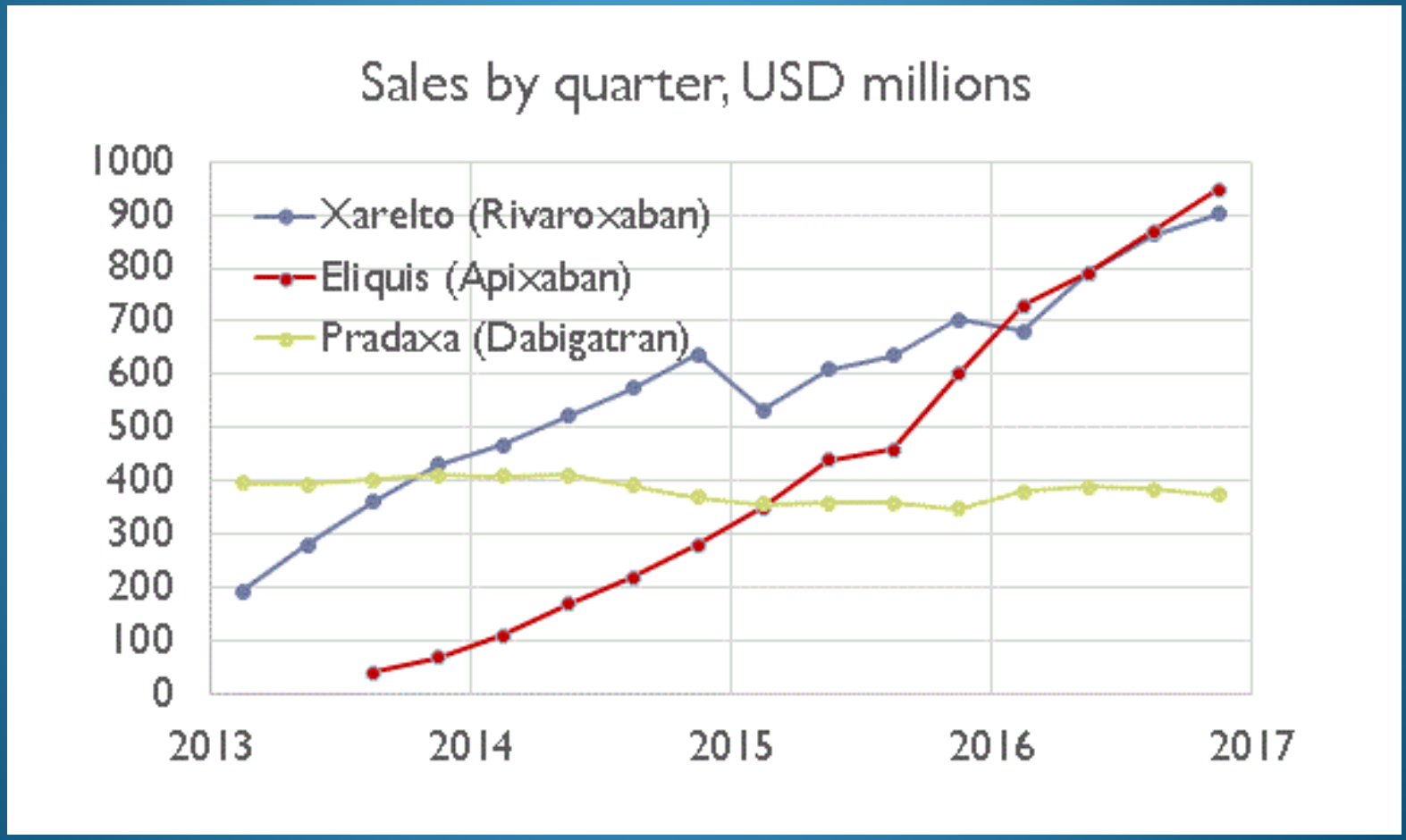
Morillo. *J Geriatr Cardiol* 2017; 14: 195–203
Miyasaka. *Circulation* 2006;114-25

Burden of atrial fibrillation

Age 40

Lloyd-Jones. *Circulation*. 2004;110 (9):1042–6

Market share



$12 billion in US revenue

Undertriage

Older adults are more frequently triaged to nontrauma centers than younger patients with similar injuries [1,2]

[1] Chang DC et al. Arch Surg. 2008;143:776-781.
[2] Faul M et al. Prehosp Emerg Care. 2016;20:594-600.

Clinical Case

- 76 year old gentleman sustained a ground level fall with isolated head trauma. He has a history of atrial fibrillation and is currently taking warfarin. GCS score is 15.

Trauma center vs. Non-trauma center?

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

A National Evaluation of the Effect of Trauma-Center Care on Mortality

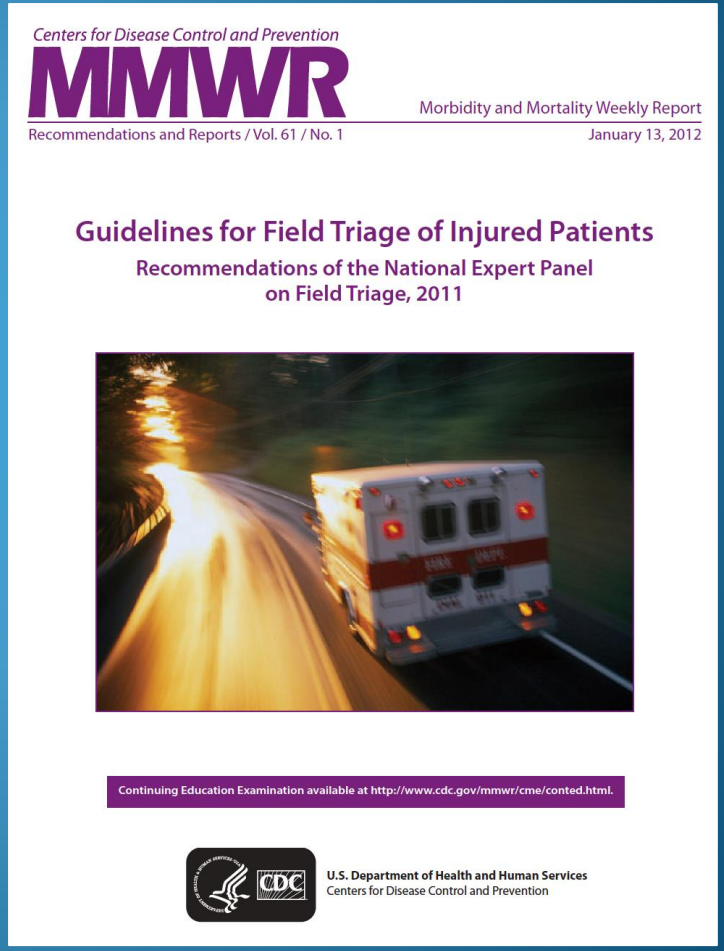
Ellen J. MacKenzie, Ph.D., Frederick P. Rivara, M.D., M.P.H., Gregory J. Jurkovich, M.D., Avery B. Nathens, M.D., Ph.D., Katherine P. Frey, M.P.H., Brian L. Egleston, M.P.P., David S. Salkever, Ph.D., and Daniel O. Scharfstein, Sc.D.

- Compared mortality at trauma centers vs. non-trauma centers
- Severely injured patients
  - 20% in-hospital mortality reduction
  - 25% one-year mortality reduction

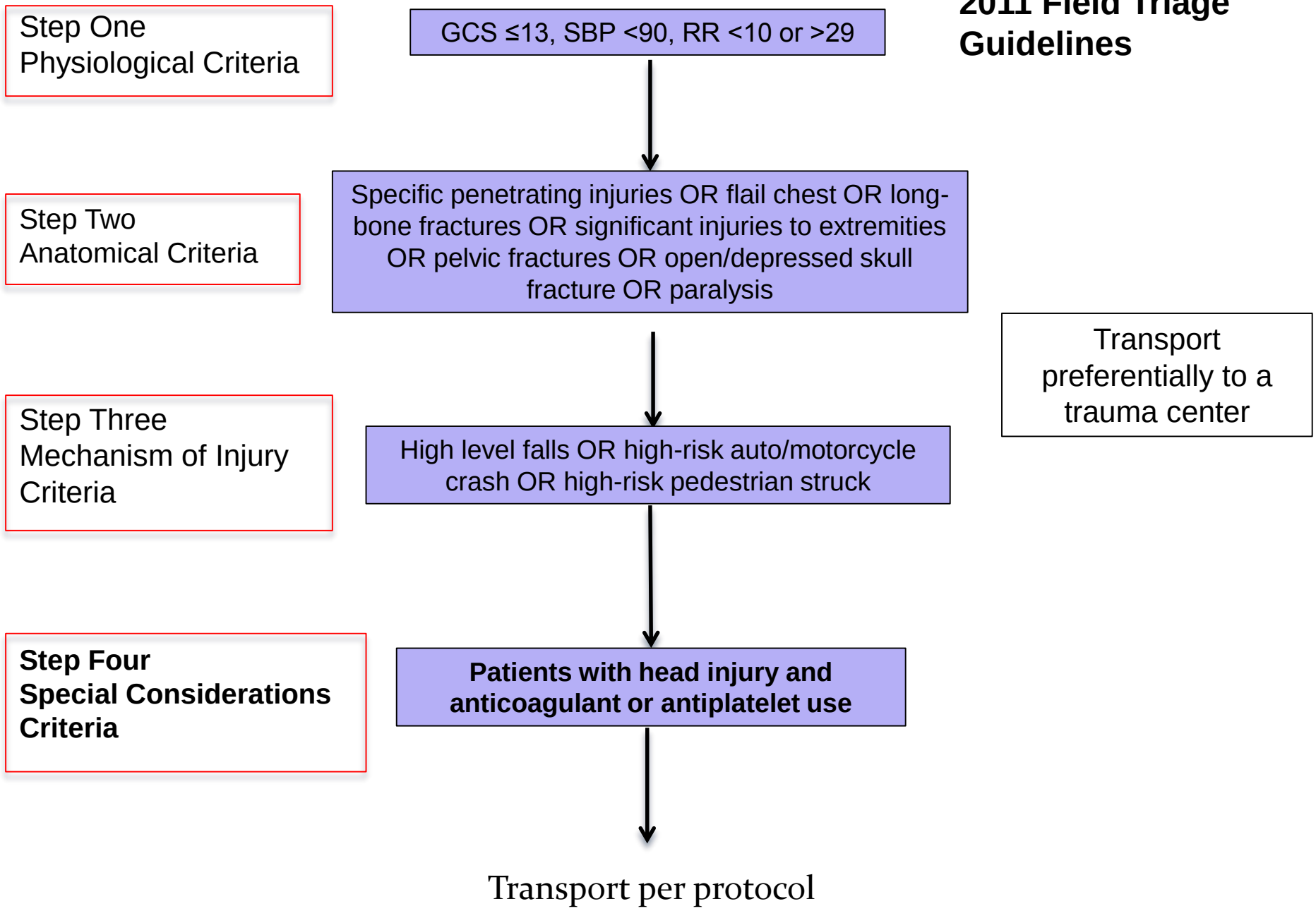
N Engl J Med 2006;354:366-78.

Current guidelines

- Guide triage of injured patients to trauma centers
- Since 1986, most recent update 2011
- Collaboration between the ACS-COT, NHTSA, and CDC
- Serves as national guidelines for EMS providers



2011 Field Triage Guidelines



≤

Anticoagulation or Antiplatelet Use

- Anticoagulant or antiplatelet use + head trauma
  - traumatic intracranial hemorrhage (tICH) 29-30% [1,2]
  - risk for death OR 3-15 [3]
- *Recommendations based largely on retrospective, trauma registry studies*

[1] Brewer et al. J Trauma 2011
[2] Chisholm et al. Am J Forensic Med Pathol 2010
[3] Wong et al. J Trauma 2008

Older adults with head trauma

- How well do EMS providers identify anticoagulation use?
- What is the burden of disease?
- How well do current triage criteria work?
- Who should be transported to a trauma center?

CDC: U01 CE002177

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Victor C. Coronado, MD,
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Mark Faul, PhD

Hospital	Trauma Center Designation
UC Davis Medical Center	Level I
Sutter Roseville Medical Center	Level II
Mercy San Juan Hospital	Level II
Kaiser Permanente South	Level II
Mercy General Hospital	Non-trauma center
Methodist Hospital	Non-trauma center
Kaiser Permanente North	Non-trauma center
Kaiser Roseville Hospital	Non-trauma center
Sutter General Hospital	Non-trauma center
Sutter Memorial Hospital	Non-trauma center
Mercy Folsom Hospital	Non-trauma center

Note: Level I and II trauma centers have 24-hour neurosurgical and neurologic intensive care capabilities

EMS Agencies in Sac County

EMS Agency	%
• AMR	278 (13)
• Cosumnes	150 (7)
• Folsom	104 (5)
• SFD	952 (45)
• Sac Metro	626 (30)

Study participants

- Inclusion
  - 55 years and older with blunt head trauma
- Exclusion
  - Interfacility transport
  - Prisoners and pregnant women
  - Unable to link EMS and hospital data

Anticoagulants and Antiplatelets

- Warfarin
- Direct oral anticoagulants: dabigatran, rivaroxaban, apixaban
- Aspirin
- Other antiplatelets: clopidogrel, ticlodipine, prasugrel, dipyridamole, cilostazol, and ticagrelor

Study procedures

Eligible patients → EMS data forms completed

EMS/hospital records linked → ED/hospital data abstracted

Older adults with head trauma

- How well do EMS providers identify anticoagulation use?
- What is the burden of disease?
- How well do current triage criteria work?
- Who should be transported to a trauma center?

Do EMS Providers Accurately Ascertain Anticoagulant and Antiplatelet Use in Older Adults with Head Trauma?

Daniel K. Nishijima, MD, MAS, Samuel Gaona, BS, Trent Waechter, RN, Ric Maloney, RN, Troy Bair, EMT-P, BA, Adam Blitz, EMT-P, BA, Andrew R. Elms, MD, Roel D. Farrales, MD, Calvin Howard, James Montoya, MD, Jeneita M. Bell, MD, Victor C. Coronado, MD, David E. Sugerman, MD, MPH, Dustin W. Ballard, MD, Kevin E. Mackey, MD, David R. Vinson, MD, James F. Holmes, MD, MPH; for the Sacramento County Prehospital Research Consortium

- Evaluate EMS medication ascertainment of anticoagulants and antiplatelet agents in older adults with head trauma
- Compared to reference standard of ED and hospital medication ascertainment

Prehosp Emerg Care 2017 21:2, 209-215

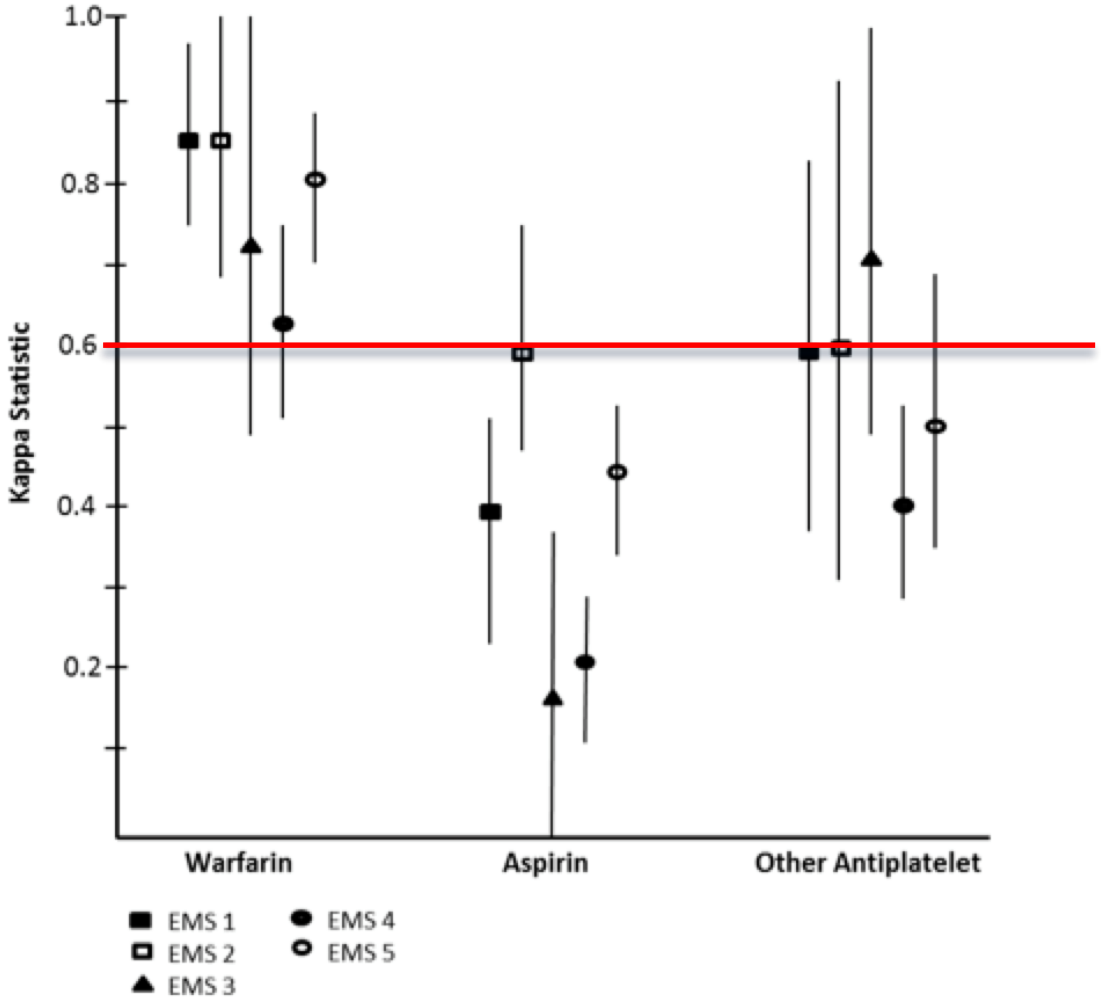
Vs.

ePCRs

ED/hospital data abstracted

Medication Ascertainment

Figure 1. Agreement stratified by EMS agency and medication



Medication Ascertainment

Conclusion

- EMS and ED/hospital providers have acceptable agreement with warfarin but not with aspirin and other antiplatelet agent use

Older adults with head trauma

- How well do EMS providers identify anticoagulation use?
- What is the burden of disease?
- How well do current triage criteria work?
- Who should be transported to a trauma center?

Burden of disease

- 1,304 patients
  - 73 years, 47% male, 72% fall from standing height or less
  - 1,147/1,304 (88%) received CT imaging
  - 112/1,147 (9.8%) had tICH on CT imaging
  - 22/1,147 (1.9%) had neurosurgery/traumatic death

J Neurotrauma 2018;35(5):750-9

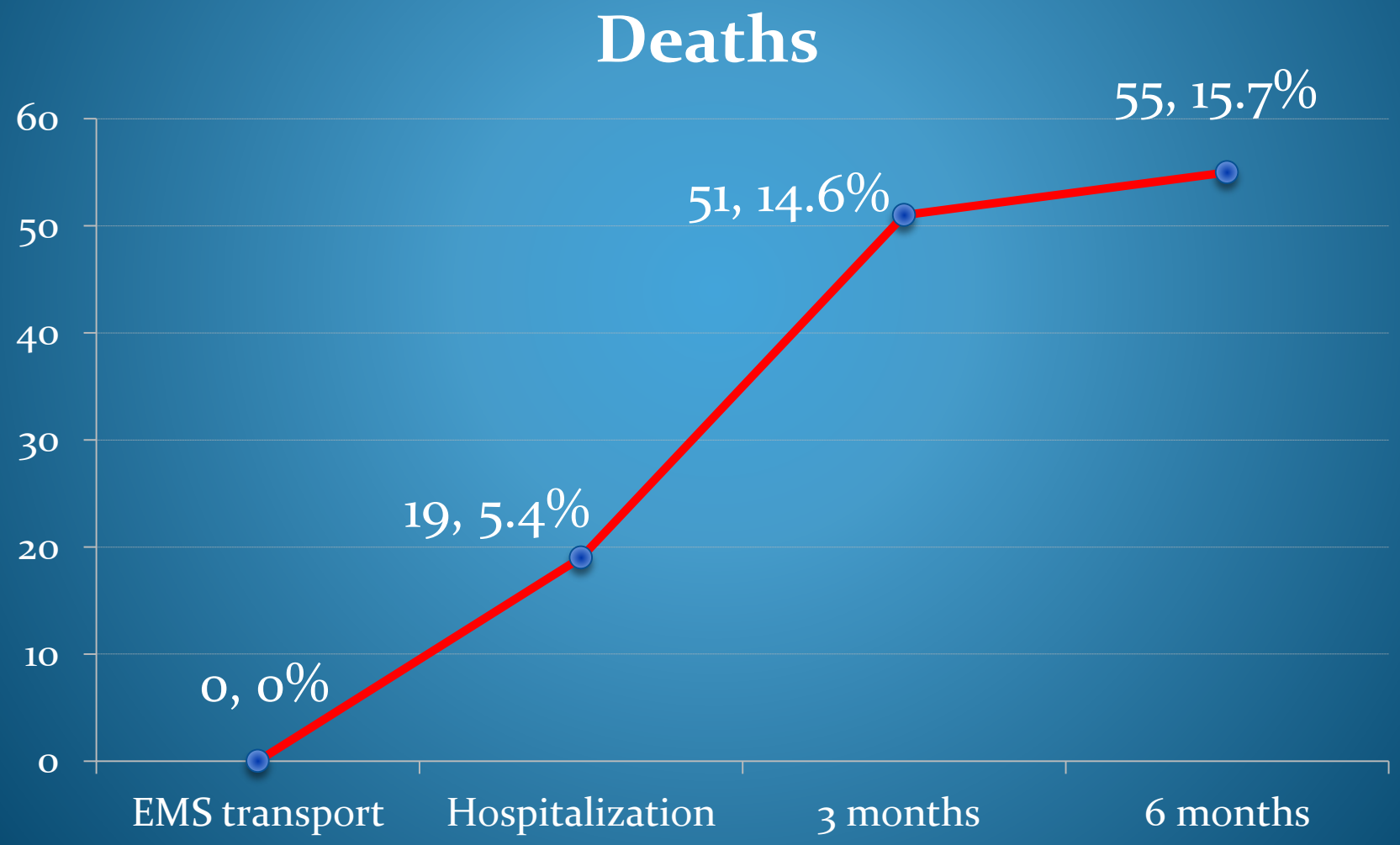
Burden of disease

Conclusion

- Primarily ground level falls
- 10% tICH rate
- 2% NSG/death rate

Burden of disease

350 patients with TBI



Are older adults taking anticoagulants or antiplatelets at a greater risk for tICH vs. if not taking these medications?

Incidence of tICH

Medication	n	% (95% CI)
No anticoagulant or antiplatelet	**65/713**	**9.1 (7.1-11.5)**
Any anticoagulant or antiplatelet	**47/434**	**10.8 (8.0-14.1)**
Warfarin alone	8/88	9.1 (4.0-17.1)
Direct oral anticoagulant alone [a]	3/41	7.3 (1.5-20.0)
Aspirin alone	25/204	12.2 (8.1-17.6)
Other antiplatelet alone [b]	4/49	8.2 (2.3-19.6)
Concomitant medications	7/52	13.5 (5.6-25.8)

[a] - dabigatran, rivaroxaban, apixaban, edoxaban

[b] - clopidogrel, ticlodipine, prasugrel, dipyridamole, cilostazol, and tigagrelor

J Neurotrauma 2018;35(5):750-9

Incidence of in-hospital neurosurgery or traumatic death

Medication	n	% (95% CI)
No anticoagulant or antiplatelet	**16/713**	**2.2 (1.3-3.6)**
Any anticoagulant or antiplatelet	**6/434**	**1.4 (0.5-3.0)**
Warfarin alone	2/88	2.3 (0.3-8.0)
Direct oral anticoagulant alone [a]	0/41	0 (0-8.6)
Aspirin alone	1/204	0.5 (0-2.7)
Other antiplatelet alone [b]	2/49	4.1 (0.5-14.0)
Concomitant medications	1/52	1.9 (0-10.3)

[b] - clopidogrel, ticlodipine, prasugrel, dipyridamole, cilostazol, and tigagrelor

J Neurotrauma 2018;35(5):750-9

Adjusted analysis for tICH

Variable	OR (95% CI)
History of vomiting	**6.65 (2.61 to 16.96)**
Evidence of trauma above the clavicles	**2.55 (1.33 to 4.88)**
Step 1 to 3 criteria	**2.49 (1.43 to 4.36)**
Abnormal EMS GCS score, initial	**2.06 (1.27 to 3.35)**
Mechanism of injury other than a fall from standing height or less	**1.92 (1.17 to 3.15)**
Loss of consciousness or amnesia	**1.63 (1.02 to 2.61)**
Any anticoagulant or antiplatelet use	1.53 (0.99 to 2.38)
Age 80 years or older	1.53 (0.96 to 2.43)
History of headache	1.11 (0.44 to 2.76)
Male sex	1.00 (0.65 to 1.53)

J Neurotrauma 2018;35(5):750-9

Sensitivity analysis: Adjusted analysis for tICH (warfarin + INR 2.0 or higher)

Variable	OR (95% CI)
History of vomiting	**6.49 (2.56 to 16.49)**
Evidence of trauma above the clavicles	**2.53 (1.32 to 4.85)**
Step 1 to 3 criteria	**2.36 (1.35 to 4.11)**
Abnormal EMS GCS score, initial	**2.05 (1.26 to 3.34)**
Mechanism of injury other than a fall from standing height or less	**1.81 (1.10 to 2.96)**
Age 80 years or older	**1.63 (1.03 to 2.58)**
Loss of consciousness or amnesia	**1.62 (1.01 to 2.60)**
Warfarin use + INR level 2.0 or higher	1.18 (0.48 to 2.87)
History of headache	1.11 (0.44 to 2.76)
Male sex	1.00 (0.66 to 1.54)

J Neurotrauma 2018;35(5):750-9

Conclusion

No substantial difference between anticoagulated and non-anticoagulated patients.

Older adults with head trauma

- How well do EMS providers identify anticoagulation use?
- What is the burden of disease?
- How well do current triage criteria work?
- Who should be transported to a trauma center?

How well do current triage criteria work?

Accuracy in predicting tICH:

1) Steps 1 to 3 criteria
2) Steps 1 to 3 criteria *and* anticoagulant or antiplatelet use
3) Actual transport to a trauma center
4) Actual transport *and* anticoagulant or antiplatelet use
5) Steps 1 to 3 criteria *and* multivariate logistic regression risk factors
6) Steps 1 to 3 criteria *and* binary recursive partitioning risk factors to identify tICH

Test Characteristics of Triage Criteria to Identify tICH

Triage criteria	Sensitivity		Specificity	
	n	% (95% CI)	n	% (95% CI)
Step 1-3 criteria	30/112	26.8 (19.5-35.7)	935/1035	90.3 (88.4-92.0)
Step 1-3 + anticoagulant and antiplatelet criteria	71/112	63.4 (54.2-71.7)	577/1035	52.7 (52.7-58.7)
Actual transport	78/112	69.6 (60.6-77.4)	420/1035	40.6 (37.6-43.6)
Actual transport + anticoagulant or antiplatelet criteria	98/112	87.5 (80.1-92.4)	255/1035	24.6 (22.1-27.4)
Step 1-3 criteria and multivariate logistic regression risk factors	110/112	98.2 (93.7-99.5)	92/1035	8.9 (7.3-10.8)
Step 1-3 criteria and binary recursive partitioning risk factors	112/112	100 (96.7-100)	112/1035	10.8 (9.1-12.9)

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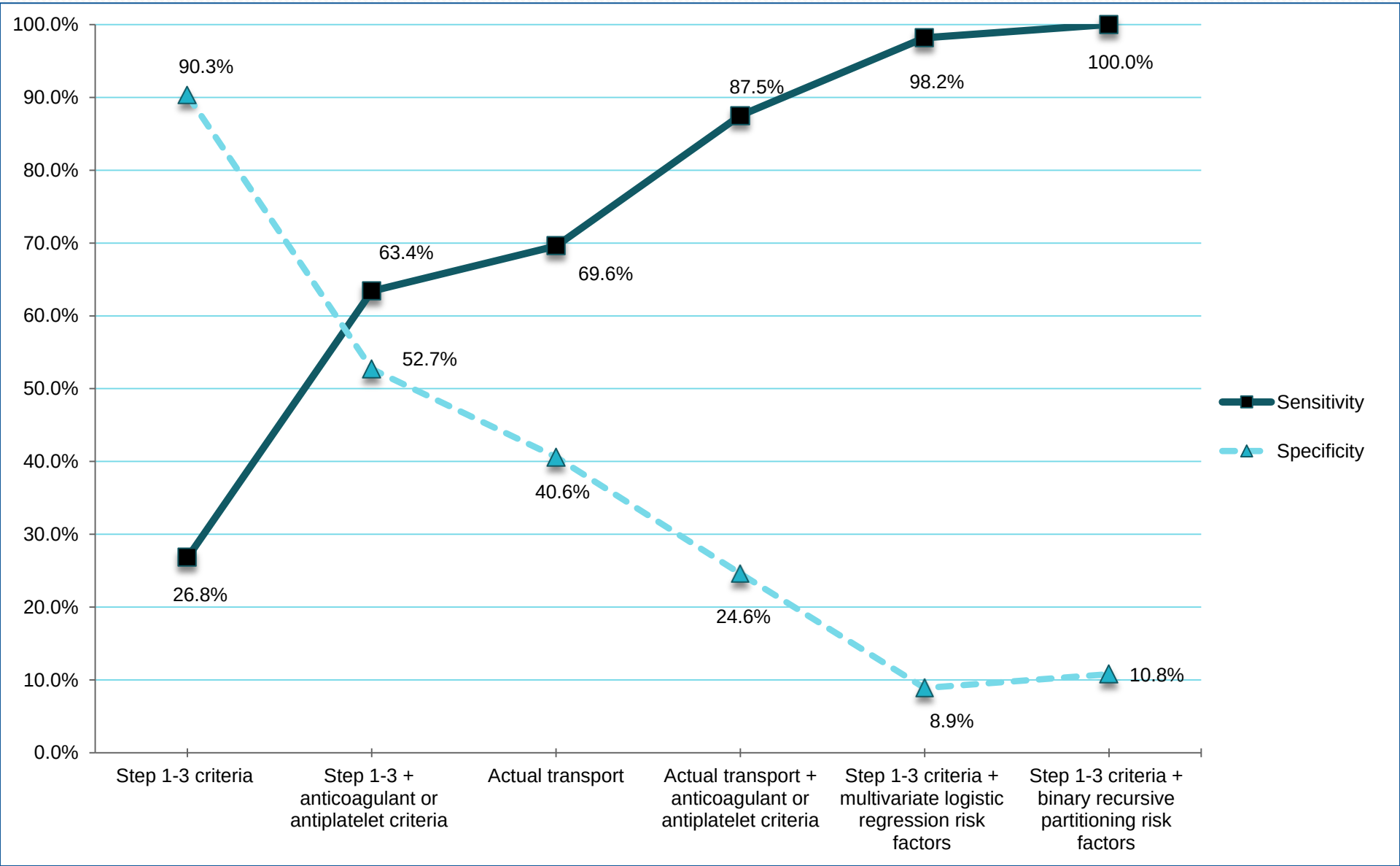
Trade-off of sensitivity and specificity of selected triage criteria to identify tICH



Conclusion

- Current field triage guidelines not particularly accurate
- Inclusion of other risk factors leads to overtriage
- Difficult patient population to triage

Bottom line

- How well do EMS providers identify anticoagulation use?
  - Warfarin – good, ASA and other antiplatelets – not so good
- What is the burden of disease?
  - 10% tICH, 2% NSG/death
  - No increased risk with AC/AP use
- How well do current triage criteria work?
  - Not so well
- Who should be transported to a trauma center?
  - Difficult patient population to triage

Next steps

- System implications of various triage criteria, interfacility transfers
- Shared decision making
- Resources for anticoagulation reversal
- Explore early post-hospitalization death

Questions???

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